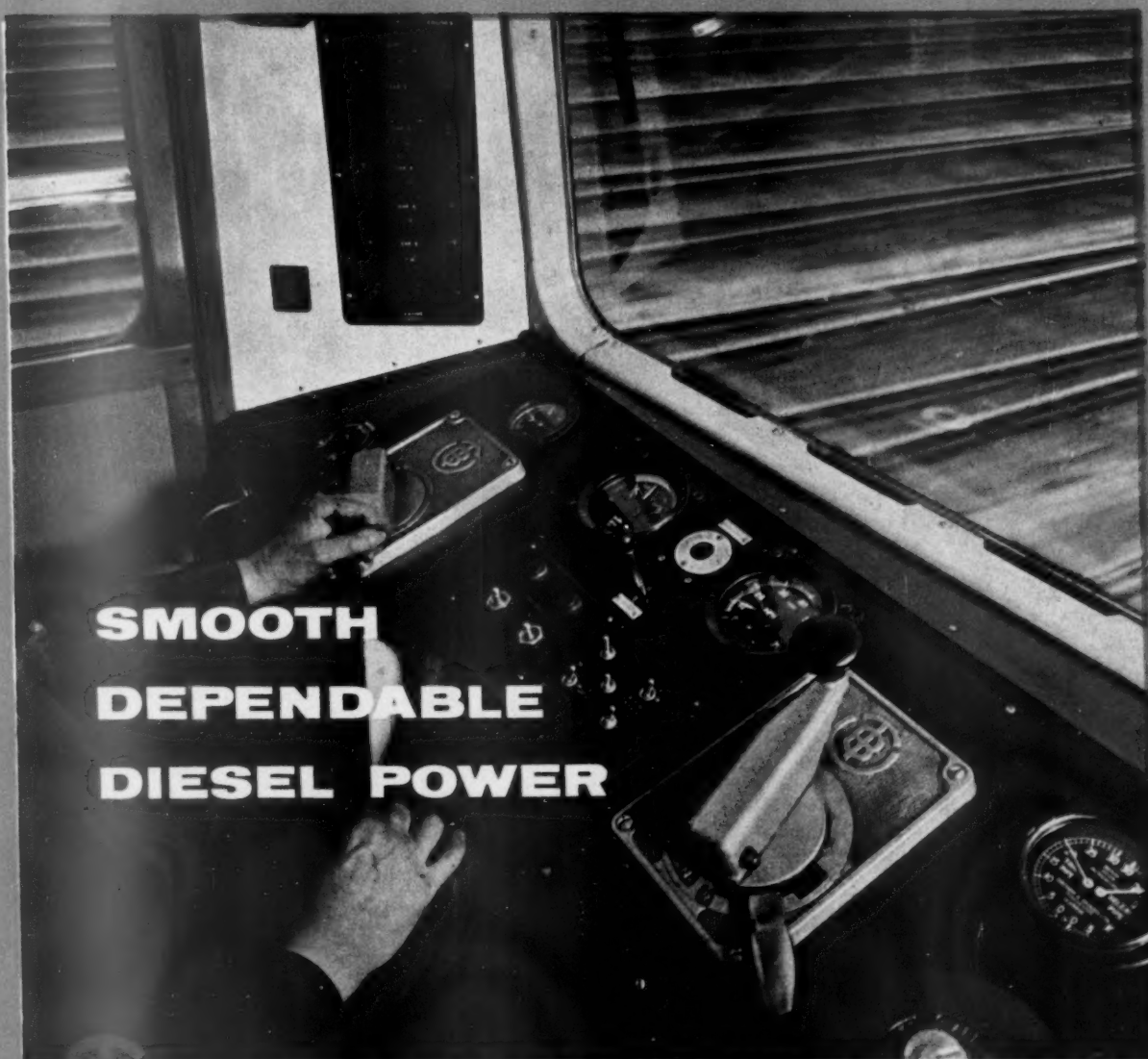


THE RAILWAY GAZETTE

Price: Two Shillings

FRIDAY, AUGUST 4, 1961

Annually £5 by post



BRITISH UNITED TRACTION LTD

Uniting the Rail Traction Resources of A.E.C. and Leyland
96 Piccadilly London W1 Telephone Grosvenor 7121

TRANS EUROP EXPRESS



New Fourcurrent Electric Luxury Train Sets track the Way for Modern Travelling

The new fourcurrent electric TRANS EUROP EXPRESS train sets owned by the Swiss Federal Railways are operated on the Zurich — Gothard — Milan and Milan — Simplon — Dijon — Paris routes. Each of the four 5-coach train sets (designed for speeds up to 160 km/h) offers accommodation for 126 passengers and is composed of three first class open saloon coaches (two pilot cars at both ends and one intermediary coach, all with luggage space), a dining car with bar and a 3300 HP motor coach which houses also kitchen and office together with separate compartments for the crew and the custom officers. All carriages have been designed and built by SIG.

The high-class comfort and the various amenities provided for in these train sets are

mainly based on the following most remarkable features:

- First class riding qualities ensured by SIG torsion bar bogies give a feeling of a smooth gliding along the track over the entire speed range
- Special sound dampening elements and pneumatically sealed entrance doors guarantee absolute noiseless travelling
- Fully draught-free gangway connections of the SIG type
- Large sized platforms enable the traveller to freely move all over the train
- Clothes and luggage can easily be deposited in spacious wardrobes
- Full air-conditioning
- Tasteful interior décor with selected colour shades
- Sealed double-glazed windows with electrically operated venetian blinds
- Wide luminous ceiling creates an even lighting effect
- Loudspeakers are provided throughout the train



Swiss Industrial Company

Neuhausen Rhine Falls

Switzerland



KENITRA

Track Maintenance Equipment

V.V.2 COILS. *In Service on Main Lines throughout the World.*

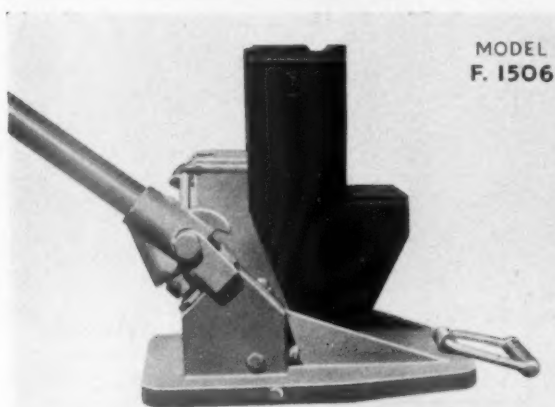


FLY SPANNERS AND
SPIKE TENSIONERS.



"MINI" TRACK JACK
and Complete Range of
HYDRAULIC TRACK JACKS
AND TOE JACKS

There is a detailed, illustrated Booklet for each one of the above "Kenitra" products.



MODEL
F. 1506

'KENHI' HEAVY DUTY TRACK JACK

This hydraulic jack is specially designed for use in the maintenance of switches and crossings, and for track renewals. It has all the needed capacity for lifting the heaviest lay-out.

Capacity: 20 tons on the head; 15 tons on the toe. Hydraulic lift 6".

Write for detailed illustrated booklet to:
KENITRA COMPANY LIMITED

54 OLD BROAD ST., LONDON, E.C.2

Telephone: LONDON Wall 7621



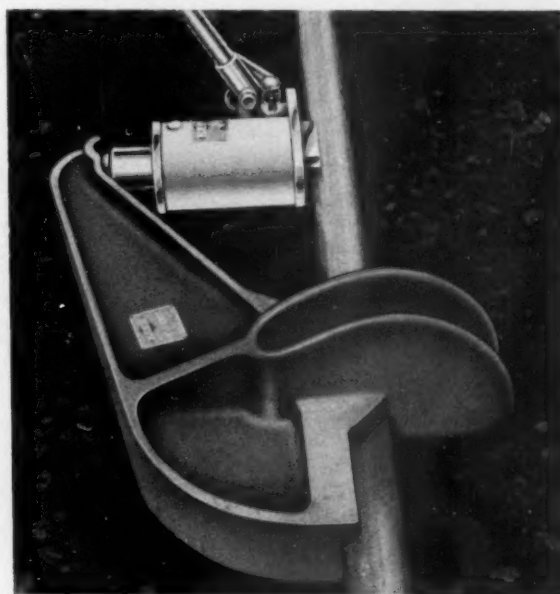
MODEL
S.2541

HYDRAULIC

RAIL BENDER

The Lightest of its kind

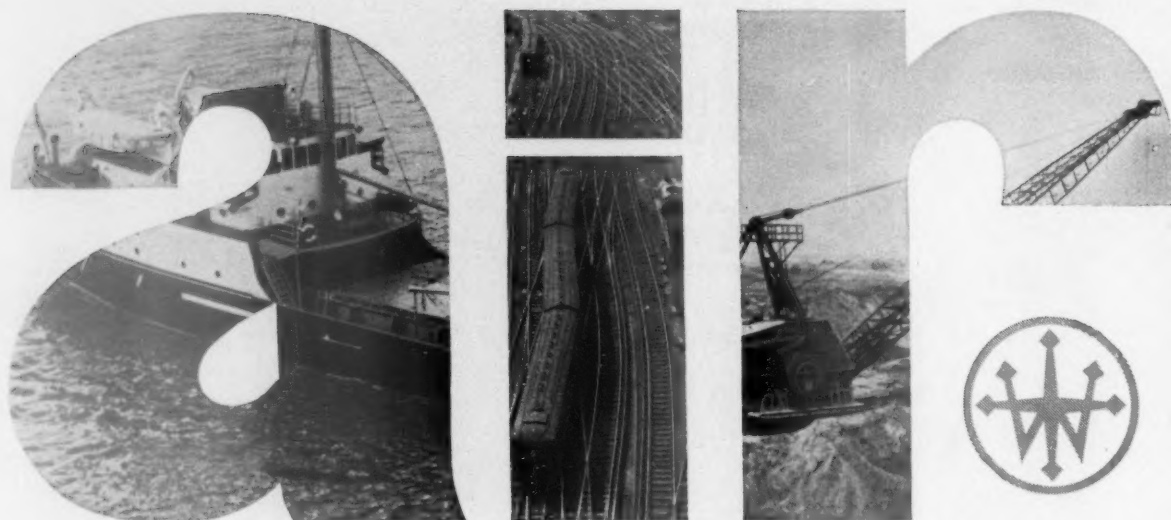
Can be Operated and removed from
the rail within seconds by one man



This "Kenhi" Rail Bender is suitable for Bull Head or Flat Bottom rails up to 109 lbs. per yard.

Many urgent jobs which hitherto could not be tackled on the site can now be done by this lighter and safer tool.

It is ideal for straightening crippled rails and putting the set in switches or stock rails, etc.



GOES EVERYWHERE



so does
Westinghouse
AIR CONTROL
EQUIPMENT

23-ton 117 h.p. special type Planet Diesel Fluidrive shunting locomotives at the North Thames Gas Board's Beckton Works, two of eight now being supplied.

POST THIS COUPON:

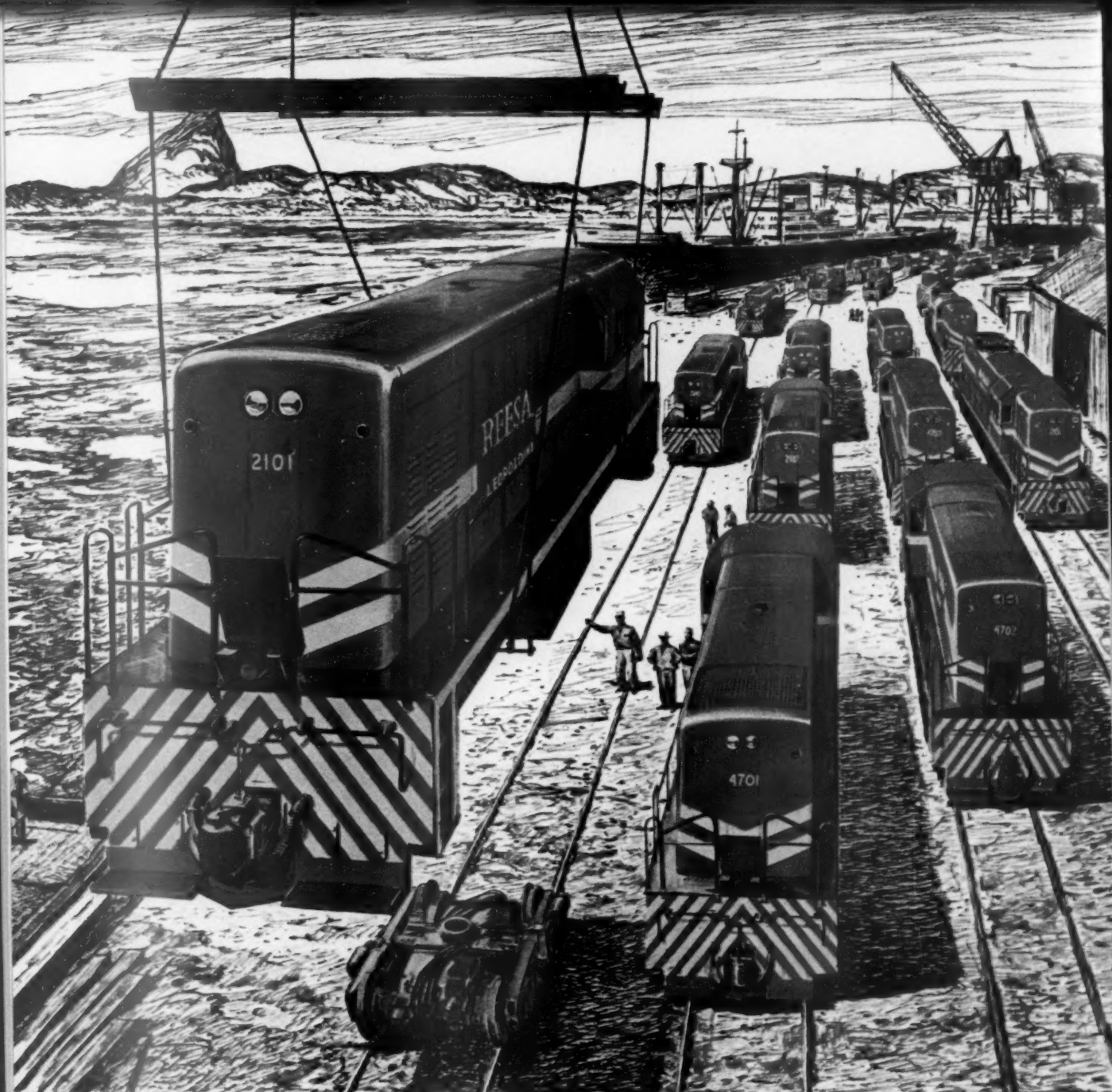
*Please send us full details of
 Westinghouse Pneumatic Control Equipment*

Name

Address

RG8
WESTINGHOUSE BRAKE AND
SIGNAL COMPANY LIMITED
Automotive and Industrial Products Division
 Hanham Rd., Kingswood, Bristol. Tel: Bristol 671781





SHIPLOADS OF PROGRESS...180 G-E locomotives will soon be delivered to the Brazilian Railway System. These versatile workhorses will provide a total of 577 General Electric locomotives to form the heart of a vital transportation system. For greater railway efficiency, economy and profits... specify General Electric.

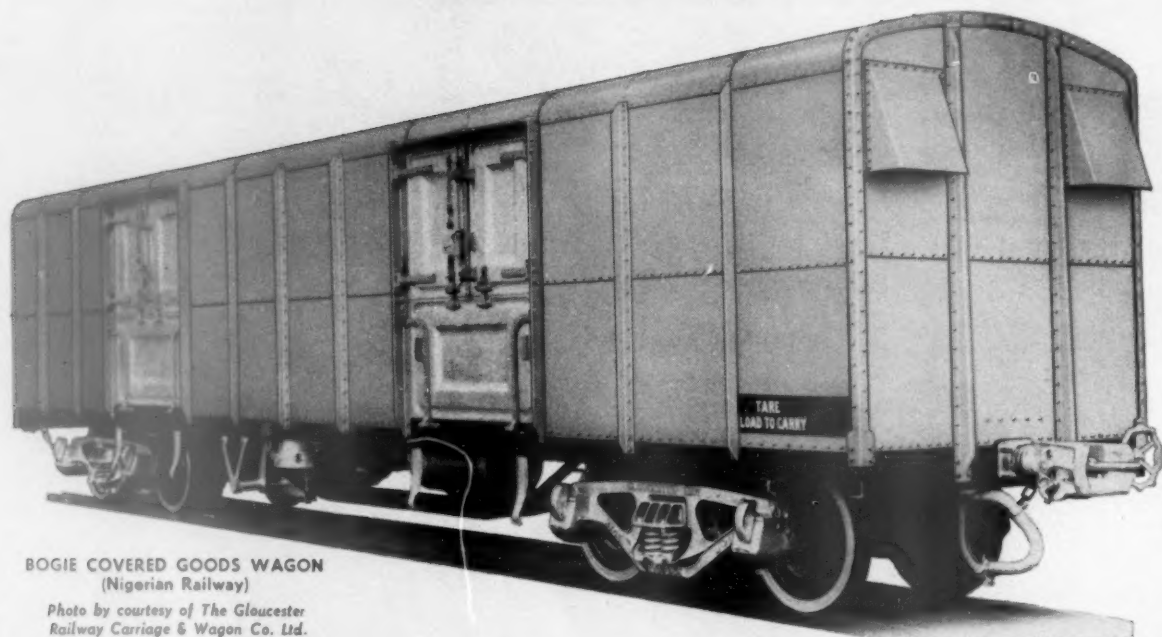
120-18

PIONEER IN RAILWAY MOTIVE POWER
FOR OVER HALF A CENTURY

GENERAL  ELECTRIC

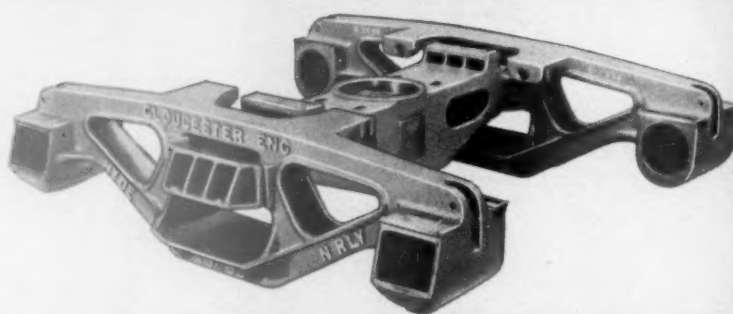
REPRESENTED THROUGHOUT THE WORLD BY THE INTERNATIONAL GENERAL ELECTRIC COMPANY • MAIN OFFICE: 159 MADISON AVENUE, NEW YORK 16, NEW YORK, U.S.A.

The Railway Gazette August 4, 1961



BOGIE COVERED GOODS WAGON
(Nigerian Railway)

Photo by courtesy of The Gloucester
Railway Carriage & Wagon Co. Ltd.



CAST STEEL BOGIE FRAMES

Gloucester Patent Cast Steel Bogie Assembly produced for the Gloucester Railway Carriage & Wagon Company Ltd., and widely used Overseas on the Nigerian, Ghana, Ceylon, Sudan and Argentine Railways.

A typical example of the high quality castings regularly supplied for GENERAL ENGINEERING, WAGONS, LOCOMOTIVES (Steam and Diesel), COMMERCIAL VEHICLES, COLLIERY PLANT and ELECTRICAL MACHINERY.



ROBERT HYDE CASTINGS

NORTH STAFFORD STEEL FOUNDRY • STOKE-ON-TRENT

Tel.: 44261-2

CLARENDON WORKS • CHESTERFIELD • Tel.: 3181-2

LONDON OFFICE: 52, GROSVENOR GARDENS • S.W.1 Tel.: SLOANE 9972



AROUND THE WORLD

OUR NAME IS RENOWNED

FOR

RELIABILITY IN RAILWAY SIGNALLING APPARATUS

AND

ALL TYPES OF GENERAL ENGINEERING



REGISTERED OFFICE
**96 YORK WAY, KINGS CROSS
LONDON N.1**

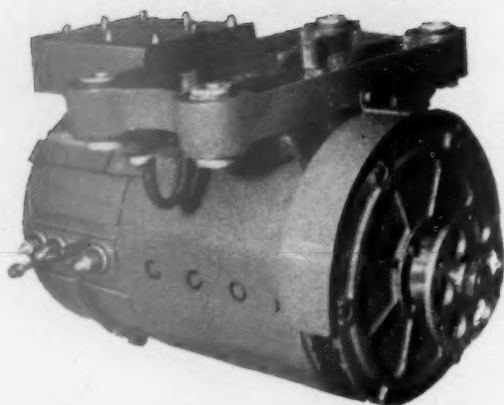
PHONE TERMINUS 8581
GRAMS SNALIG LONDON N.1

WORKS
**FAZAKERLEY
LIVERPOOL-9**

PHONE AINTREE 2358-9
GRAMS SIGCO PHONE LIVERPOOL 9

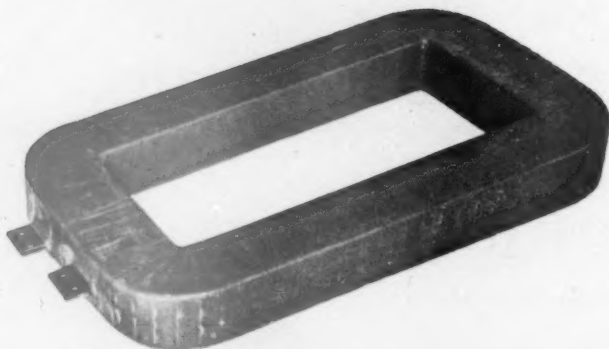
REPRESENTATIVES IN

**SOUTH AFRICA, AUSTRALIA, NEW ZEALAND,
CHINA, URUGUAY, BRAZIL, EGYPT, ARGENTINE AND GREECE.**



A traction motor has to withstand a combination of rough treatment—both electrical and mechanical—that no ordinary motor could be expected to endure. And it has to pack a lot more power into smaller dimensions. To the designer this is not just one problem but a collection of problems, to which solutions are found not all at once but one at a time, many of them perforce on the basis of experience accumulated over the years.

This thing called know-how



Take this field coil from a C.P. traction motor. It looks more like a forging than a coil—and in a sense it is; a hard, precisely dimensioned, pressed square frame forming a coherent mass in which the conductors are buried and securely held; proof against dirt, water and vibration. This is the kind of know-how that comes of 80 years in the business.

Crompton Parkinson

LIMITED



Makers of Electric Motors of all kinds A.C. and D.C. Generators, Cables, Switchgear, B.E.T. Transformers, Instruments, Lamps, Lighting Equipment, Batteries, Stud Welding Equipment, Traction Equipment, Ceiling Fans.

TRACTION DEPARTMENT, CHELMSFORD, ESSEX Tel: Chelmsford 3161 'Grams & Cables: Crompton, Chelmsford
TE611

TRAVELLING COMFORT IN MODERN EXPRESS TRAINS



The present standard of comfort makes travelling in the modern express trains a special pleasure. It is, above all, the dust-free, temperature-controlled air that gives travellers great ease. This comfort is made possible by air-conditioning equipment running through the whole train and hidden from the eye—a marvel of technical development.

For instance, all Trans Europ Express Trains of the German Federal Railways (TEE) are equipped with **Luwa** air-conditioning plants, system **Jettair**. For the air-conditioning equipment shown at the International Exhibition in Brussels we were awarded the Silver Medal. The passengers of the German Sleeping Car Company (DSG) and the Compagnie Internationale des Wagons-Lits et des Grands Express Européens (CIWL) enjoy the advantages of this proved air-conditioning equipment.

Among other overseas railways the Iranian State Railway for their modernization programme have equipped all 1st and 2nd-class passenger and dining cars with the **Jettair** system. The saloon train of H.M. the Shah, also, is being equipped with the **Luwa** system.

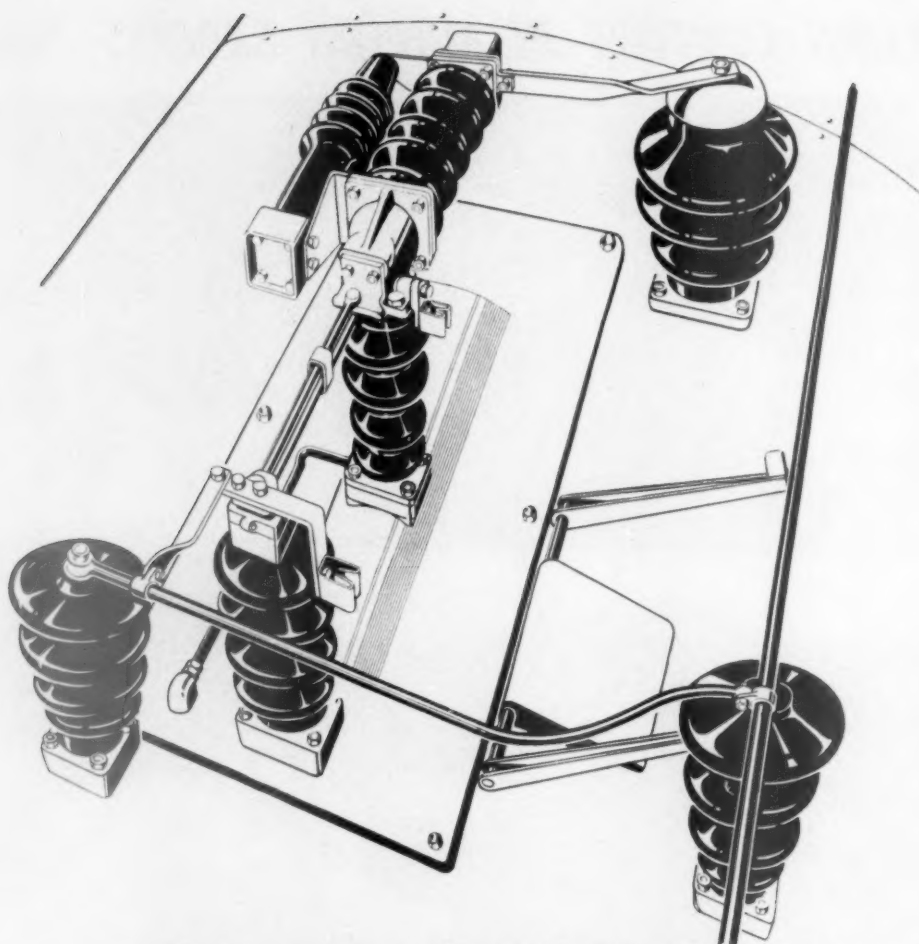
Top quality and continuous technical progress characterise the air-conditioning and pressure ventilation equipment built by us.

Luwa GmbH FRANKFURT AM MAIN, GERMANY

200-202, Hanauer Landstrasse. Telephone: 48541 Cable Address: Luwa Frankfurtmain. Telex: 0411775

Representatives for the United Kingdom and Colonial Territories:

Feska Industrial Equipments, Ltd., 2, Charlotte Street, London, W.1.



MAIN-LINE ELECTRIFICATION

This Reyrolle 25-kV single-phase air-blast circuit-breaker has been designed specifically to control the incoming supply to electric locomotives

- 400 amperes current rating.
- 250-MVA breaking capacity at 25 kV.
- Compact and robust construction.
- Simple six-bolt fixing to roof of cab.
- Immediate access to all major working-parts to facilitate maintenance.
- Operation from locomotive's compressed-air system.

Hebburn - County Durham - England

Reyrolle

THE WINDSOR LIGHTWEIGHT RECLINER

for coaches and railcars



The Windsor Lightweight Recliner is but one of the many types of seats designed for transport comfort by G. D. Peters. Every type of seating, from the simplest to the most luxurious, is made by G. D. Peters for most types of transport in use throughout the world. To know more about these seats write to:

G. D. PETERS & CO. LTD

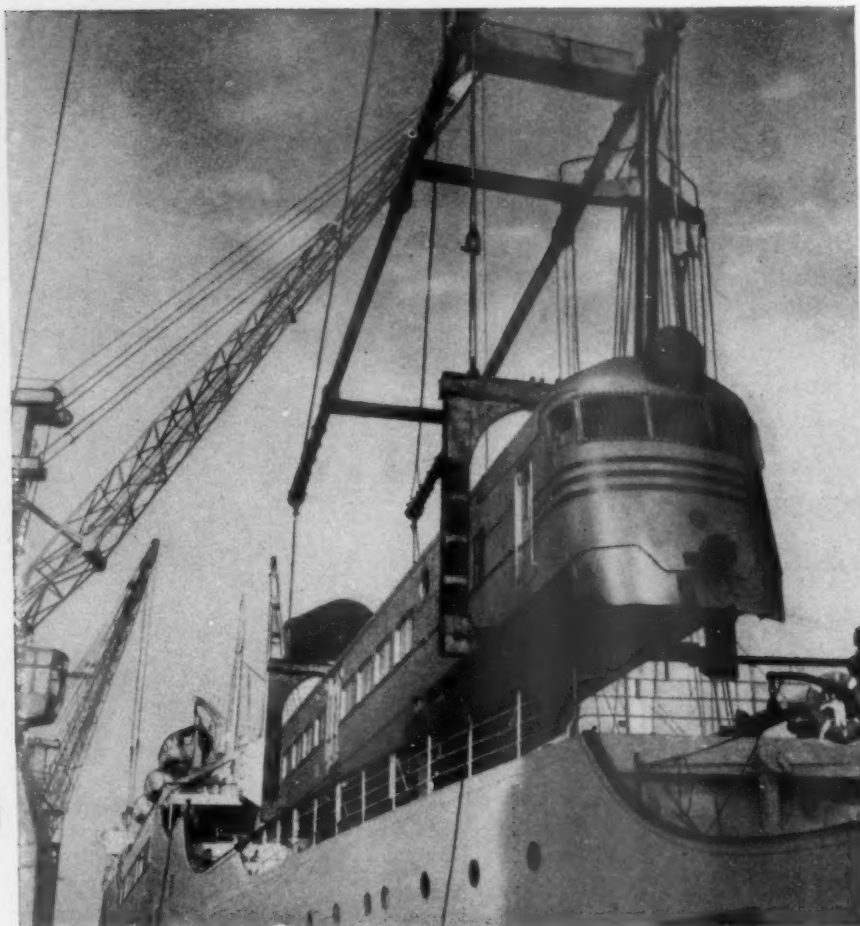
Windsor Works, Slough, Bucks.

A MEMBER OF THE G. D. PETERS GROUP

Telephone: SLOUGH 23201 (6 lines)

Telegrams: PETERS SLOUGH

**Ganz
Mávag**
BUDAPEST



**WE ARE
SHIPPING
THEM**

**ALL OVER THE
WORLD ! !**

SPEED • COMFORT

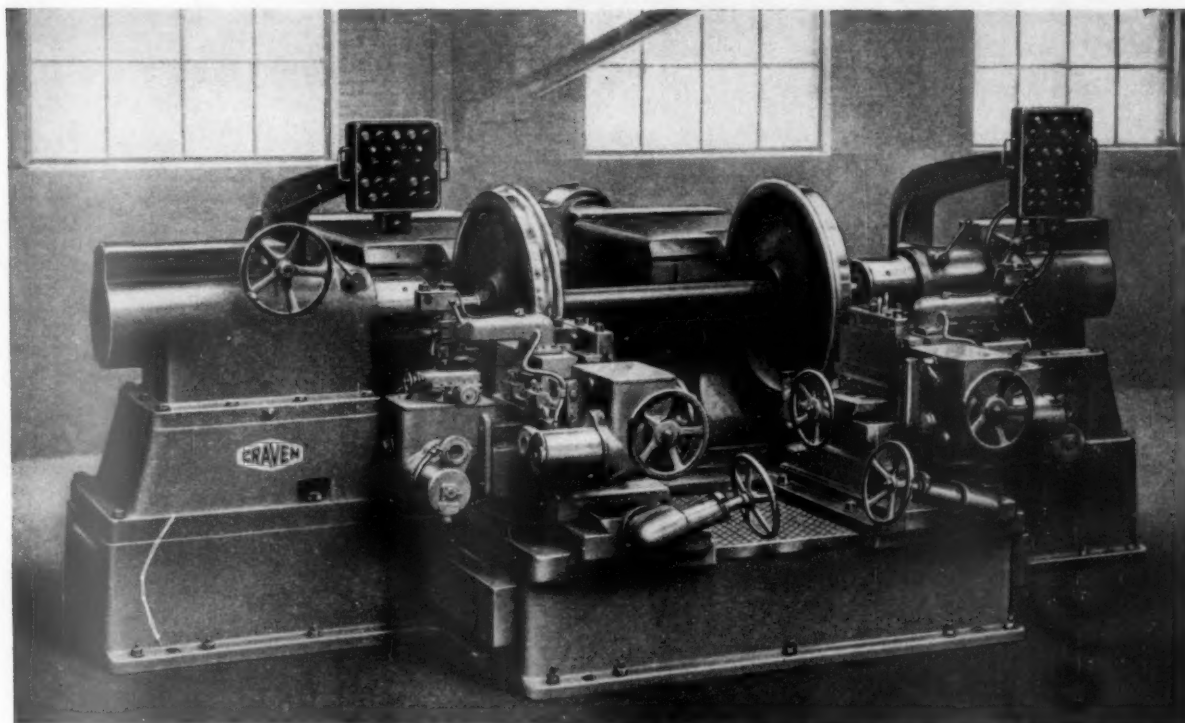
RELIABILITY • BEAUTY OF DESIGN

- ★ *Diesel and Electric Locomotives*
- ★ *Railcars*
- ★ *Railcar Trams*

**GANZ-MÁVAG LOCOMOTIVE AND
RAILWAY CARRIAGE MANUFACTURERS,
MECHANICAL ENGINEERS**

BUDAPEST 70 • P.O.B. 136 • HUNGARY

Cables: Ganzmávag Budapest



Floor-type Friction Roller Drive Wheel Lathes

FLOOR-TYPE AND PIT-TYPE

WHEEL LATHES

WITH FRICTION ROLLER DRIVE AND ELECTRICAL PROFILING

Recent developments in Craven Railway Wheel Lathes utilise carbide tools for re-turning diesel and electric traction wheels. The floor-type lathe deals with dismantled wheel sets, either with or without their axle-boxes in position: the pit-type lathe re-turns wheel sets in position on the vehicle. The drive is by two pairs of hydraulically-loaded friction rollers—one pair to each wheel—giving a balanced, self-contained thrust upon the wheel rims to transmit a high driving torque without risk of distortion. Tread and flange form profiling is by Craven patent fully-automatic, single-point electrical profile copying equipment.

Patent Nos. 849291 & 833326.

and application No. 29749/59.



MACHINE TOOLS

**CRAVEN BROTHERS
(MANCHESTER) LTD**

VAUXHALL WORKS • REDDISH • STOCKPORT • ENGLAND

METCALFE'S

AIR BRAKE EQUIPMENT

for Locomotives

OERLIKON PATENT DESIGN



TYPE FV.3 An Automatic Driver's Air Brake Control Valve suitable for medium length goods and passenger trains or railcars, etc. This Valve is simple to operate and of light weight construction. It enables the full benefit to be obtained from modern step-by-step application and release of air brakes. Leaflet A.1.



TYPE FV.4 A standard Driver's Automatic Air Brake Control Valve with automatically controlled high pressure brake releasing impulse. This Valve enables the maximum speed of brake release to be obtained, and in addition enables the full utilisation of all the advantages associated with modern air brakes. The Valve is reliable in service and simple to operate and maintain and is especially suitable for long express passenger and goods trains. Leaflet A.4.



TYPE FD.1 This is a simple Brake Control Valve suitable for direct braking or shunting brake requirements. It is very simple to use and accurate in operation. The type FD.1 Valve can also be adapted for the control of the Diesel engines and can also be made suitable for cam operation. Leaflet A.13.



TYPE LST.1 A locomotive Triple Valve of modern and simple design. The LST.1 Operating Valve embodies a control for freight or passenger train operation, together with a high efficiency Brake relay, also an Anti-skid Brake device may be provided when required. This Valve is capable of controlling the air supply to several Brake Cylinders when required. Leaflet A.2.

DAVIES & METCALFE LTD.

INJECTOR WORKS · ROMILEY · ENGLAND

Telephone: WOODLEY 2626 (2 lines)

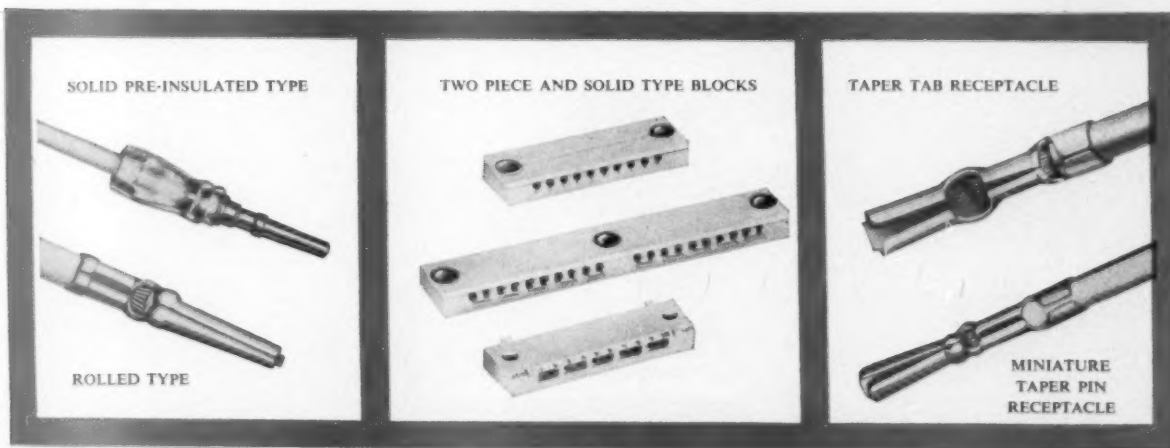
Telegrams: EXHAUST, ROMILEY

PROBLEMS OF INNER SPACE



More and more equipment is being confined in less and less space. Miniature components of high efficiency and new techniques call for the revision of wiring and termination designs to meet requirements of space, weight and size, and to increase reliability. A-MP Taper Technique extends the advantages of solderless termination to these new developments. A-MP Taper Pins, Taper Blocks, Taper Tab Receptacles and Miniature Taper Receptacles provide high contact pressure, electrical stability and great mechanical strength. By the use of the special tools designed by A-MP for attaching terminations to wires, unprecedented speeds of output are achieved, and complete uniformity of electrical and mechanical qualities.

A new catalogue is now available dealing entirely with A-MP Taper Technique. May we send you a copy?



TRADE MARK

★ Trade Mark of
A-MP Incorporated U.S.A.

TAPER TECHNIQUE

AIRCRAFT-MARINE PRODUCTS (GT. BRITAIN) LTD

Head Office: Dept. 18

AMPLO HOUSE, 87/89 SAFFRON HILL, LONDON, E.C.1

Tel: CHAncery 2902 (7 lines)

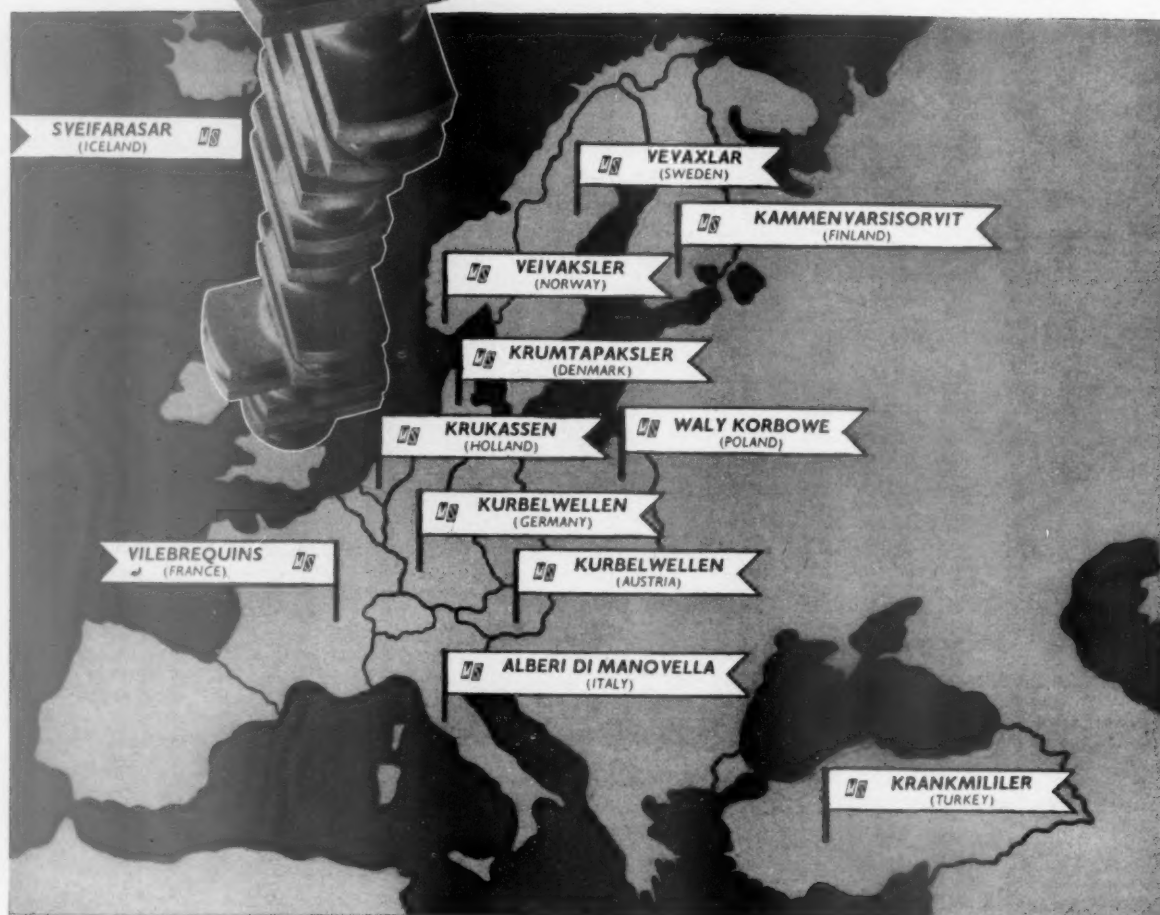
Telex: 23513

Cables: AMPLO LONDON TELEX

SOUTH AFRICA: DISTRIBUTOR: E. S. MOWAT & SONS (PTY) LTD, 51-57, MILNE STREET, P.O. BOX 487, DURBAN, NATAL, SOUTH AFRICA
ASSOCIATED COMPANIES IN: AUSTRALIA, U.S.A., CANADA, HOLLAND, FRANCE, GERMANY, ITALY, JAPAN AND MEXICO

AP 102

MITCHELL SHACKLETON MEANS CRANKSHAFTS in any language

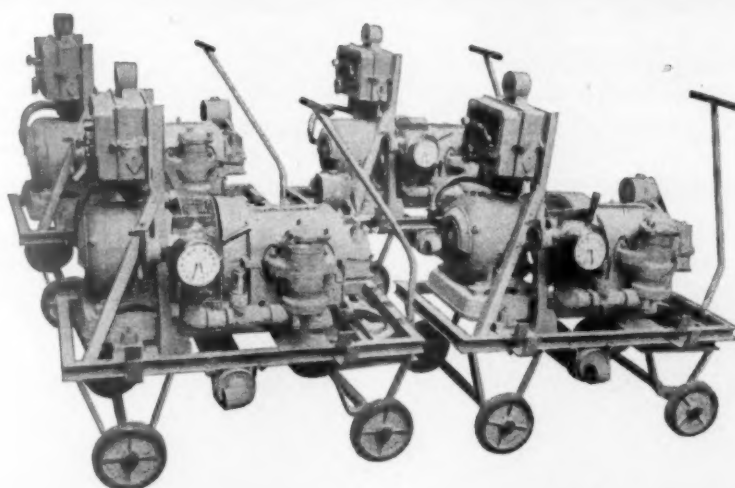


MITCHELL SHACKLETON & COMPANY LIMITED

VULCAN WORKS • PATRICROFT • MANCHESTER

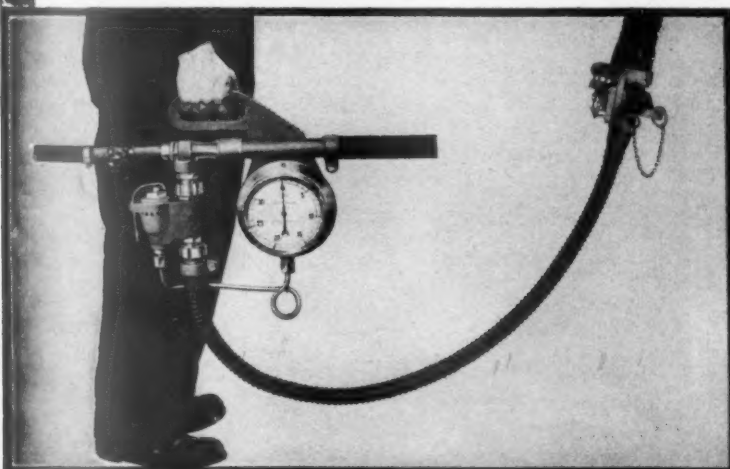
Associated Company : CLARKE'S CRANK & FORGE CO. LIMITED • LINCOLN

GRESHAM'S VACUUM BRAKE TESTING EQUIPMENT

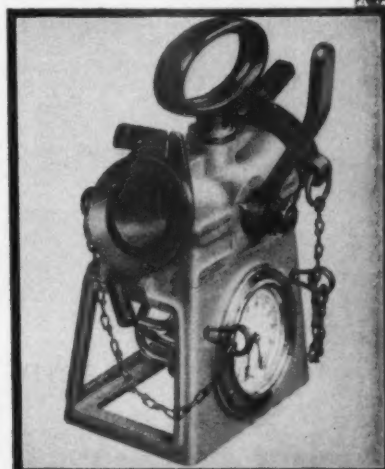


Large stationary sets for marshalling yards, complete with testing valves and automatic control of exhaustor motors, also available.

Illustration shows part of a consignment of motor driven portable testing sets incorporating Northey rotary exhaustors of 90 c.f.m. capacity.



Portable compressed air operated vacuum testing set for dealing with single vehicles in workshops or repair depots.



Leakage searcher for locating defective brakes on vehicles already coupled together and attached to a locomotive.

GRESHAM & CRAVEN LTD

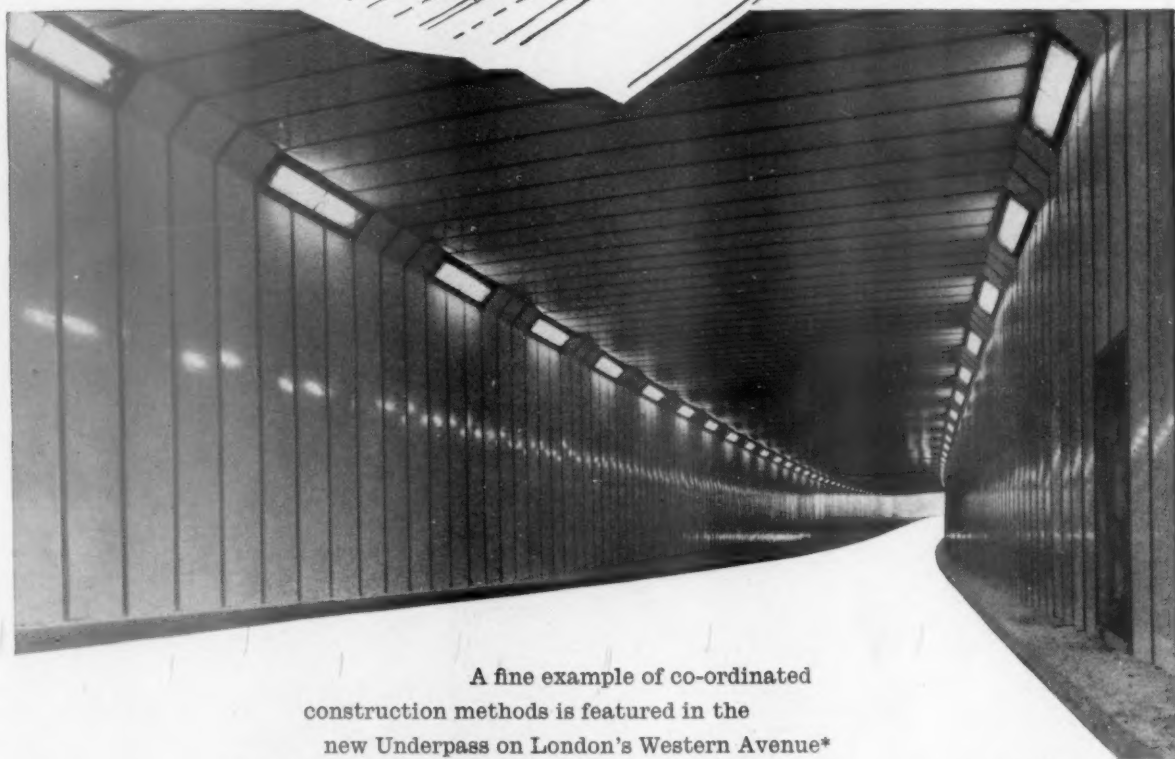
London Office & Sales: 15 WHITEHALL, S.W.1. Tel. TRAfalgar 6611-2
Cables, Loco Brake, London



HEAD OFFICE AND WORKS: Brake Division, P.O. Box No. 4,
Norfolk Street, Worsley Road North, WALKDEN, Manchester.
Tel.: FAO 2041 (14 lines) Grams: BRAKE, PHONE, WALKDEN, MANCHESTER



Underpasses and Overheads



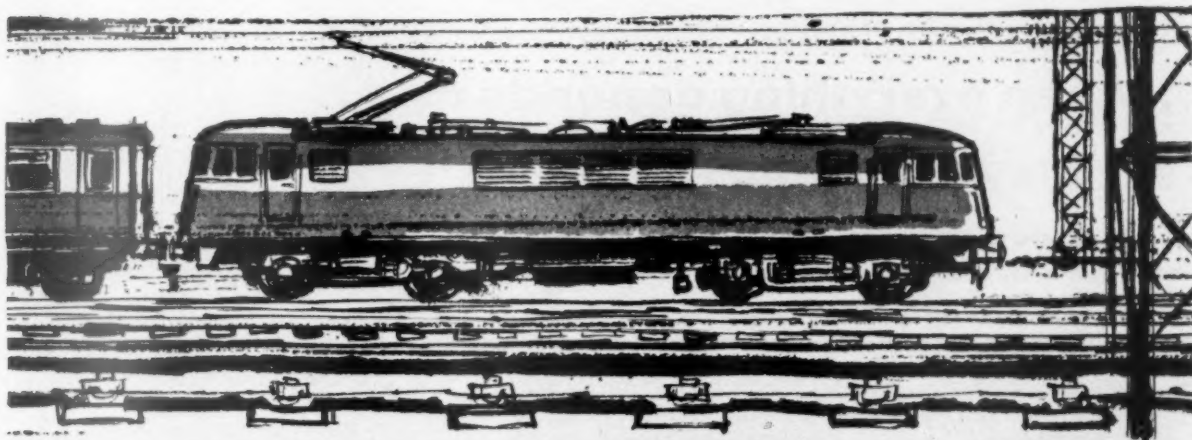
A fine example of co-ordinated construction methods is featured in the new Underpass on London's Western Avenue* where Aluminium Alloy extrusions, manufactured by Southern Forge Ltd., are used throughout for framing the interior walls. Strong, durable and light to handle, Alminal Aluminium Alloy provides a versatile and economic material in modern building and road construction.

*Consulting Engineers to Ministry of Transport
Messrs. Rendel, Palmer & Tritton
Main Contractors
A. E. Farr Ltd.
Sub-Contractors for tunnel lining
Baileys (Bristol) Ltd.

Southern Forge LTD

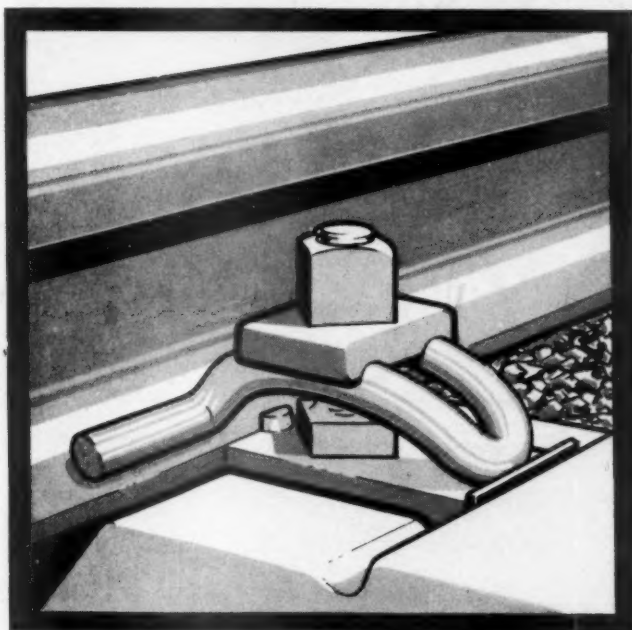
MEADFIELD ROAD · LANGLEY · BUCKS
Telephone: LANGLEY 301

MANUFACTURERS OF ALUMINIUM ALLOY EXTRUSIONS TUBES AND FORGINGS



KEEP TRACK

Today's 100 m.p.h. traffic makes big demands on the track. To help cope with this problem, Bayliss, Jones & Bayliss have developed resilient rail fastenings for use with concrete sleepers and long welded rails. Approved by the British Transport Commission, these tough spring steel fastenings are the latest additions to the BJB range, which still includes, of course, many traditional types of fastening.



BAYLISS, JONES & BAYLISS LIMITED

Head Office: Victoria Works, Wolverhampton. Tel: Wolverhampton 20441

London Office: GKN House, 22 Kingsway, London, W.C. 2. Tel: CHA 1616

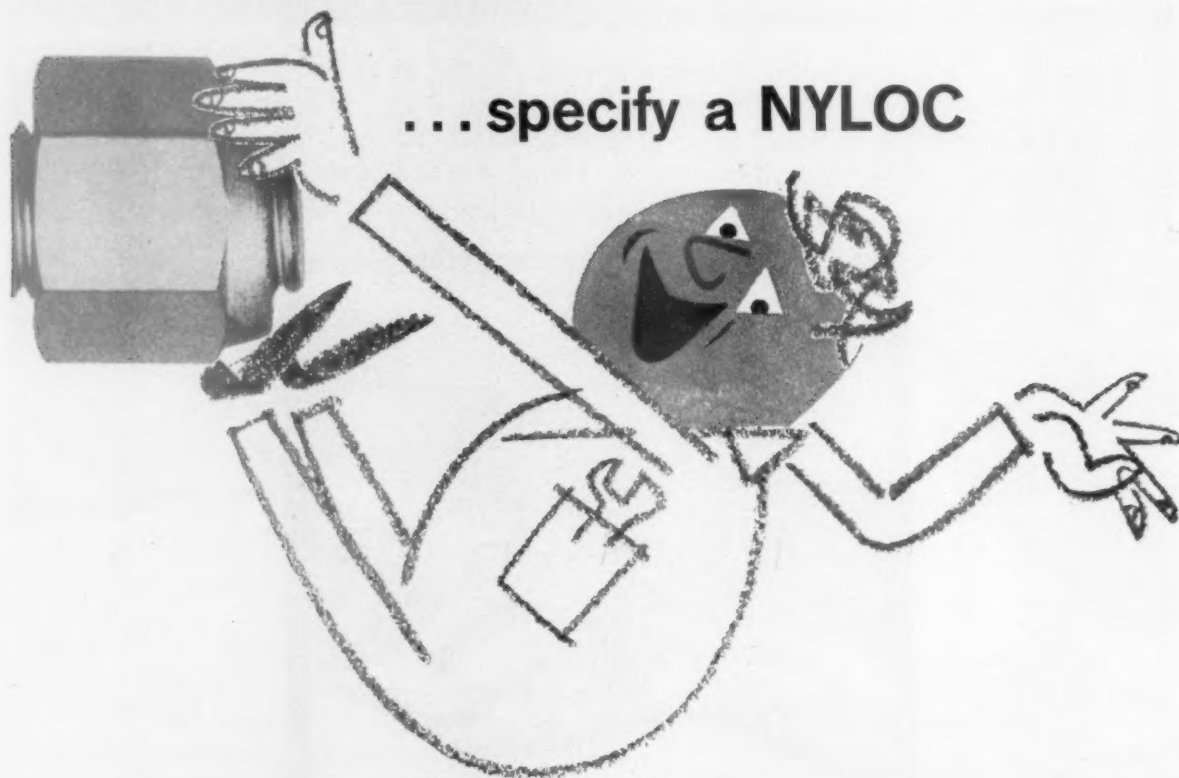
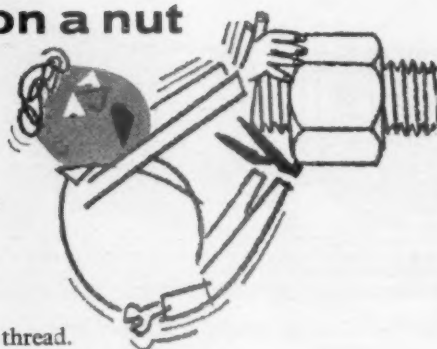


...when everything depends on a nut

A lot can depend on a single nut—safety, efficiency, your reputation as a manufacturer. If that's the sort of exacting role the nut has to play, there are six good reasons why you should choose a Nyloc:

- * Nylocs are self-locking anywhere on the bolt thread. * Nylocs stand up to shock, vibration, oil, corrosives and extremes of temperature.
 - * Nylocs can be used again and again. * Nylocs don't damage the bolt thread.
 - * Nylocs have no extra bits and pieces to fit or get lost. * Nylocs save time and money (it takes 40 minutes to assemble 100 $\frac{1}{4}$ " Nylocs as against 60 minutes to assemble 100 $\frac{1}{4}$ " full nuts and jam nuts*)
- If you want still more reasons, send for the Nyloc brochure—it's free and includes complete tables of all Nyloc types, sizes, threads, materials and finishes.

* These times are based on 'The Handbook of Standard Time Data for Machine Shops' by Haddon & Genger published by Thames and Hudson Limited, London.



... specify a NYLOC

**SIMMONDS
AEROCESSORIES
LIMITED**

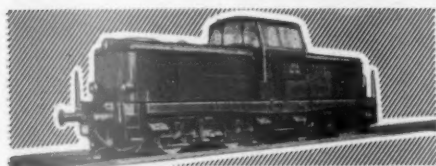
TREFOREST, PONTYPRIDD, GLAMORGAN

Branches: LONDON · BIRMINGHAM · MANCHESTER · STOCKHOLM
COPENHAGEN · BALLARAT · SYDNEY · JOHANNESBURG · NAARDEN
MILAN · NEW YORK · BRUSSELS AND MANNHEIM

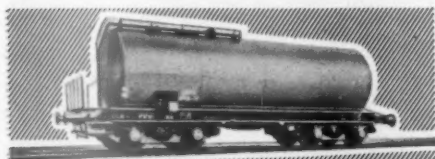


A MEMBER OF THE FIRTH CLEVELAND GROUP

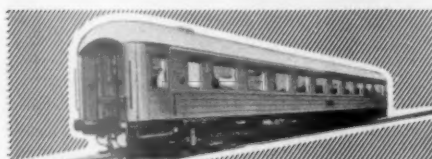
CRC 51N



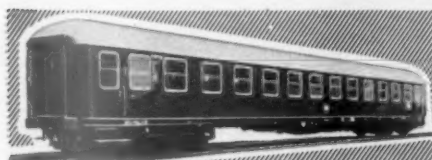
Diesel locomotive of the Danish State Railways,
built by A/S Frichs, Aarhus



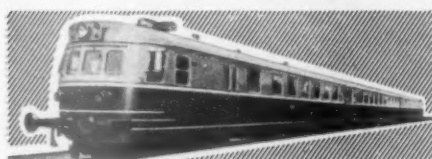
Tank wagon of the Iranian State Railways,
built by Linke-Hofmann-Busch, Salzgitter Watenstedt



Passenger coach of the Swedish company TGOJ,
built by Kockums, Malmö



Express train coach of the German Federal Railways,
built by Rathgeber, Munich

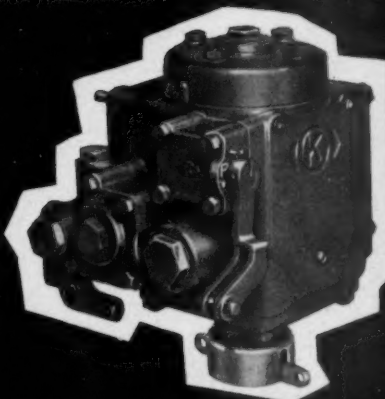


Railcar train of the Norwegian State Railways,
built by A/S Strømmens Værksted, Strømmen



Single-engined railbus of the British Railways,
built by Waggon- und Maschinenbau GmbH, Donauwörth

Knorr KE Type Air-Brakes for all Rail Vehicles



This **KE** universal triple valve

forms the basis of the brake equipment for all types of rolling stock: locomotives, passenger coaches and goods wagons as well as railcars and railbuses. By the attachment of accessory components the action of the valve can be extended to meet the highest demands. The Knorr KE air-brake offers the maximum degree of security and economy. Up to now KE brakes have been supplied to 28 countries in the world.



KNORR-BREMSE GMBH MUNICH W. Germany

Manufacturers and Agents in the United Kingdom:
Laycock Engineering Ltd. Victoria Works Millhouses, Sheffield S

22 into 4 will go!

Allow us to enlarge on this statement!
You are given a remote group of 22 subscribers.
You wish to connect them to a central control.
What is the least number of pairs of wires required? Normally, the answer would be 22 pairs of wires. Now, however, the answer is simply 4 pairs of wires. The equipment that brings about the simplification is the TMC EXTENSIBLE LINE CONNECTOR No. 1 — which makes it possible for remote units of between 10 and 22 subscribers to be connected to a central control by only 2 or 4 pairs of wires — instead of between 10 and 22 as required by conventional means. The system can be installed initially with only 2 junctions for 10 subscribers and extended as the number of subscribers increases. Yes, 22 into 4 will go — the TMC way!

PRINCIPAL FEATURES OF THE SYSTEM

- No power requirements at the remote stations.
- Manual or automatic working without modification.
- Incoming and outgoing calls are the same as for directly connected subscribers.
- Revertive calls as for any other class of call.
- Can be used in tropical climates.
- Faults automatically indicated in the main exchange.

TMC
It's more economical, naturally

EXTENSIBLE LINE CONNECTOR No. 1

Further information from:
TELEPHONE MANUFACTURING COMPANY LIMITED

Telephone and Switching Division • Martell Road • London • SE21
Telephone: GIPay Hill 2211

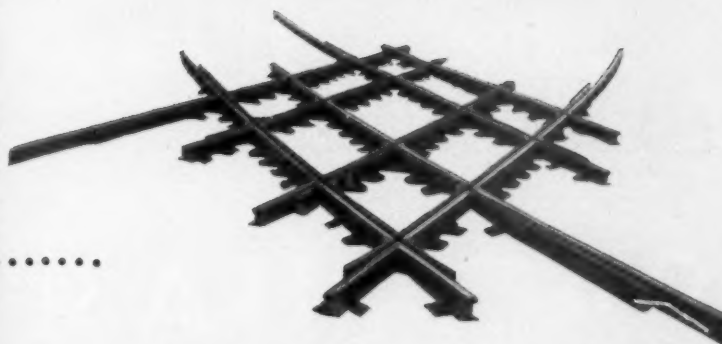
A MEMBER OF THE  GROUP OF COMPANIES

CONTINUED DEVELOPMENT

Track Layout assembled at Hadfields Ltd., before despatch to British Railways. Fabricated from Rolled "Era" Manganese Steel rails of 109 lb. F.B. section, this junction has an overall length of 310 ft. x 30 ft. width. j.....



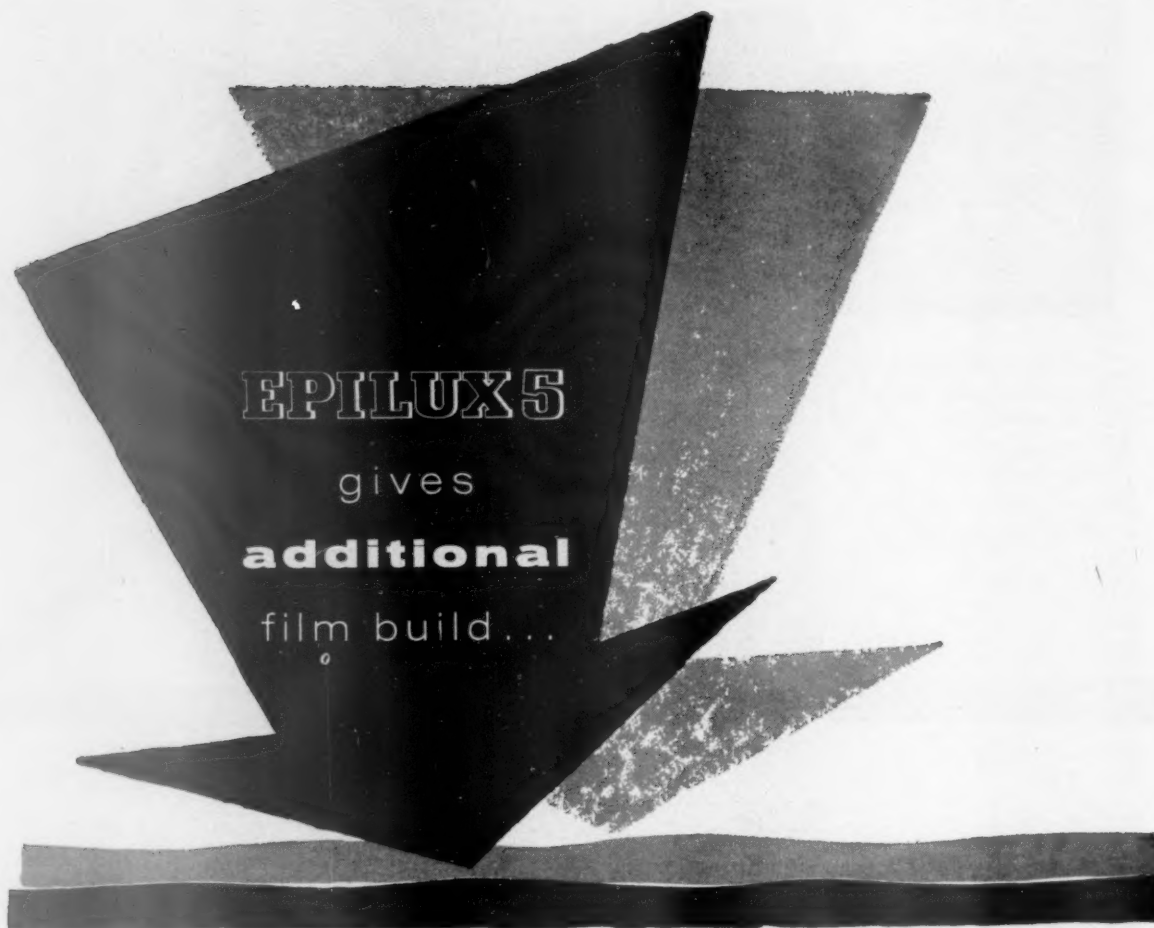
Layout for British Railways comprising one nest of 16 cast "Era" Manganese Steel Single Intersection leg crossings, rail section 109 lb. F.B. Depth of castings 6½". Approx. overall dimensions 240 ft. x 60 ft. ...



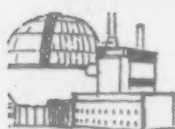
Solid Cast Monoblock Crossing

HADFIELDS
SHEFFIELD

HADFIELDS LTD., EAST HECLA WORKS,
SHEFFIELD, ENGLAND.



...greater protection against Corrosion



For use where the most severe industrial corrosive conditions exist, 'Epilux 5' gives extra-depth protection with each coat: a single application of this remarkable coating can be made 4-5 mils thick without sagging, compared to a conventional paint-thickness of 1-2 mils. The high-solids content in 'Epilux 5' which makes possible this saving in time and labour is only one of the outstanding characteristics resulting from a perfect combination of Epoxy Resin and Coal Tar Pitch.

Other important advantages of heavy duty 'EPILUX 5'

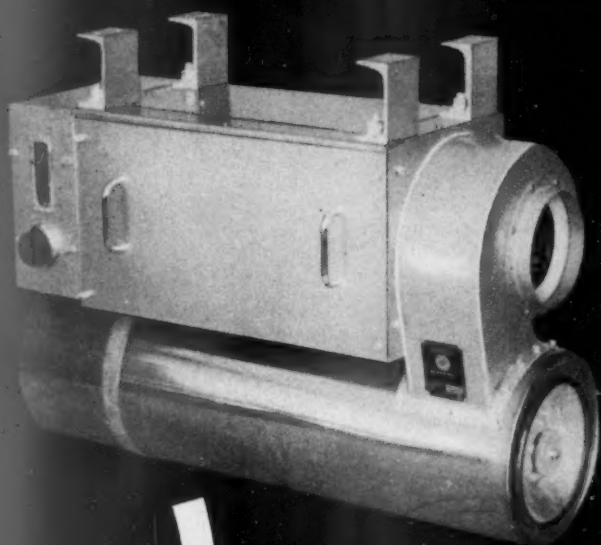
Solvent resistance superior to ordinary bituminous type coatings. Excellent water-resisting properties. Resistance to alkali and chemical attack. Excellent flexibility, adhesion and hardness. Withstands 300°F without crazing, sagging, loss of gloss or thermoplasticity. Non-bleeding, after curing (7 days). Cures under water if necessary.

Safeguard the future of steelwork with **EPILUX 5** CATALYSED COLD SETTING COATING

Write for literature and specifications to

BRITISH PAINTS LIMITED Portland Road, Newcastle upon Tyne, 2
Northumberland House, 303-306 High Holborn, London, W.C.1. Mersey Paint Works, Wapping, Liverpool
Belfast · Birmingham · Bristol · Cardiff · Leeds · Manchester · Norwich · Plymouth · Sheffield · Southampton · Swansea and all principal towns





DRAGONAIR

*world renowned heating for Railways
aircraft, shipping and industry*

THE ULTIMATE IN

RAIL-CAR HEATING

cheap heat everywhere with automatic

DRAGONAIR

DRAGONAIR LTD FARLINGTON PORTSMOUTH

Telephone: Cosham 76451

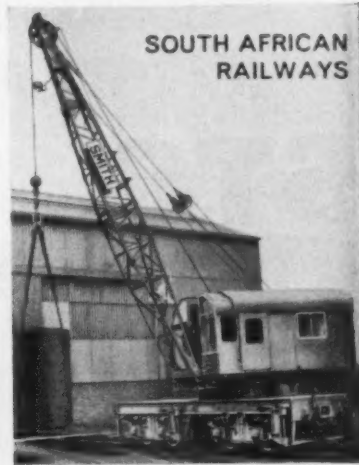




BRITISH
RAILWAYS

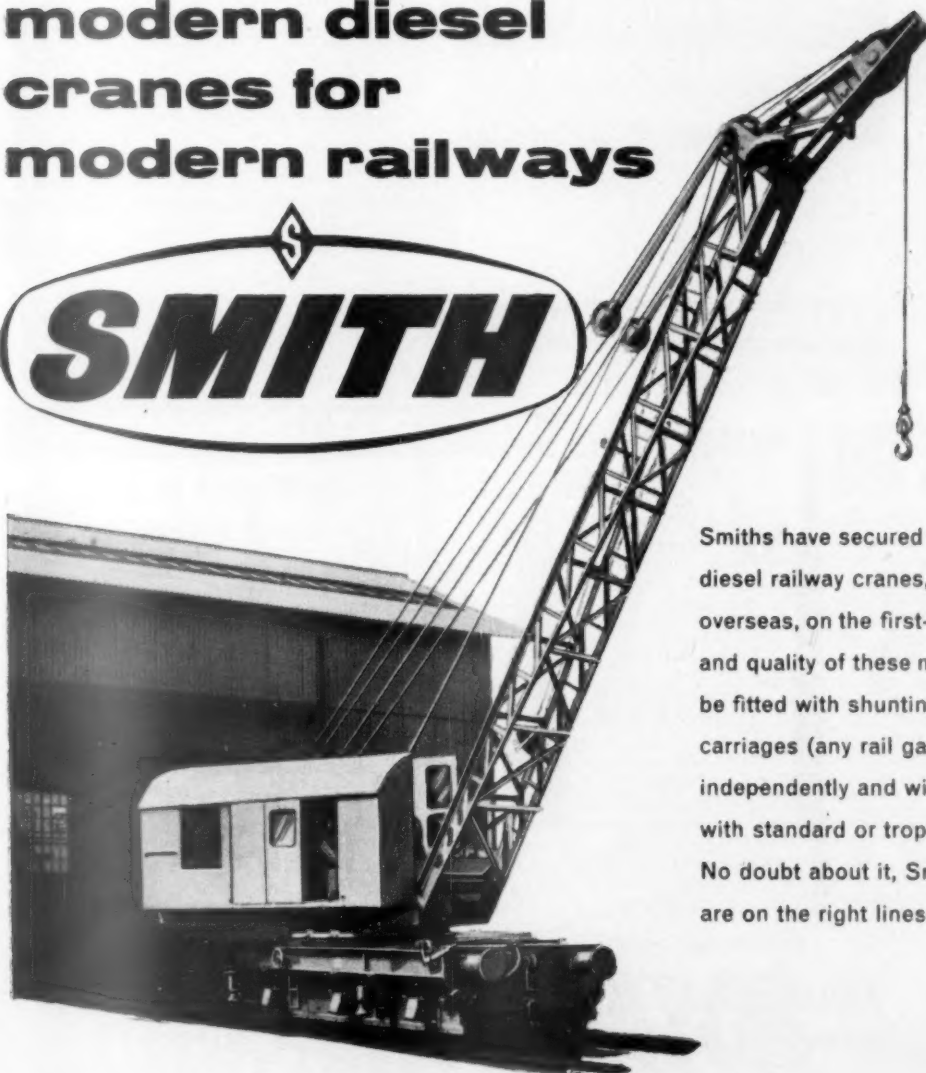


INDIA STATE
RAILWAYS



SOUTH AFRICAN
RAILWAYS

modern diesel cranes for modern railways

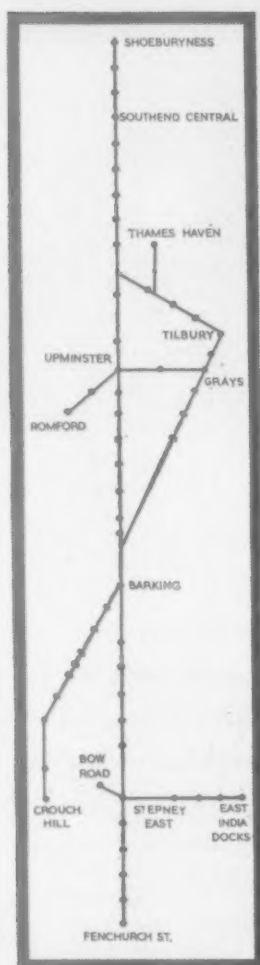


Smiths have secured many contracts for diesel railway cranes, both in Britain and overseas, on the first-class design, efficiency and quality of these machines. They can be fitted with shunting or non-shunting carriages (any rail gauge), to travel independently and with rolling stock; and with standard or tropical cabs, as specified. No doubt about it, Smith railway cranes are on the right lines—all over the world!

THOMAS SMITH & SONS (RODLEY) LTD., RODLEY, LEEDS, ENGLAND

STC

and railway modernisation



ALUMINIUM SHEATHED TELECOMMUNICATION CABLES FOR EASTERN REGION ELECTRIFICATION SCHEME

STC are manufacturing and installing telecommunication cables with plain and corrugated aluminium sheaths and P.V.C. anti-corrosion protection for the London—Tilbury—Southend route.

The aluminium sheath provides screening against induction from the traction system.

A feature of the corrugated aluminium sheathing is its improved flexibility during installation.

VOICE FREQUENCY CABLE

CARRIER FREQUENCY CABLE

SIGNAL POST TELEPHONE CABLE



7 Star Quads
0.050 in. (1.27 mm)
Conductors,
Aluminium Sheathed
and P.V.C. protected.



27 Star Quads
0.050 in. (1.27 mm)
Conductors,
Corrugated
Aluminium Sheathed
and P.V.C. protected.



15 Pairs
0.050 in. (1.27 mm)
Conductors,
Aluminium Sheathed
and P.V.C. protected.



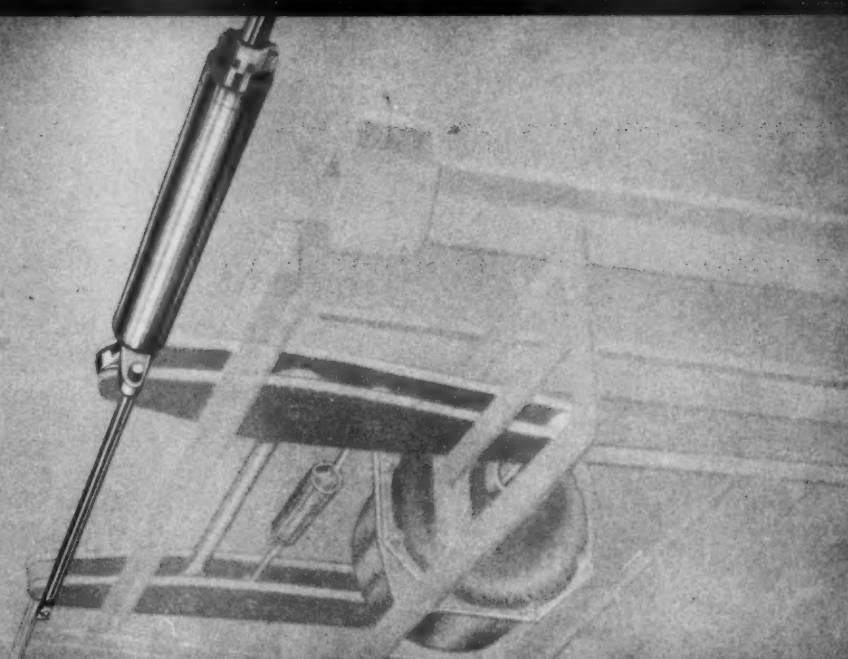
61/98

another STC communication cable project for British Railways

Standard Telephones and Cables Limited

TELEPHONE CABLE DIVISION: NORTH WOOLWICH · LONDON · E.16

SAB DOUBLE-ACTING RAPID-WORKING BRAKE REGULATOR TYPE DRV



IN MORE THAN 50 COUNTRIES

Although the productions of the SAB Company cover a wide range of empty/loading braking devices, the product most closely associated by railway engineers with the symbol SAB is the double-acting, rapid-working SAB Brake Regulator.

SAB Brake Regulators have been delivered to leading Railways in more than 50 countries all over the world. In most of these countries, SAB Brake Regulators have been adopted as a standard component of the brake equipment. They have gained a reputation for efficiency and reliability, resulting in an ever increasing number of installations on all types of railway vehicles.



BRAKE REGULATOR TYPE DRV

The most advanced member of the SAB slack adjuster family is the fully automatic, double-acting, rapid-working Brake Regulator Type DRV, the result of more than 40 years of specialised experience of automatic slack adjustment.

The DRV regulator is built into the brake rigging as part of a pull rod. It rapidly takes up or pays out slack, thus maintaining correct brake block clearances. In addition it contributes to easier replacement of worn brake blocks, no manual adjustment being required after the operation. The DRV Brake Regulator also makes it possible to use a simple mechanical empty/loading braking device.



TECHNICAL ASSISTANCE

Whenever brake slack adjustment and empty/loading braking problems require an effective solution, it is advantageous to consult SAB.

The SAB Company has built up an important service organisation which, with its expert knowledge, is ready to deal with any problem relating to brake rigging and brake installation for all types of railway vehicles.

The SAB Service Engineering Department checks proposed brake rigging designs and provides detailed installation drawings as a service to customers. It also assists whenever necessary at the actual mounting on the vehicle.

BROMSREGULATOR

MALMÖ — SWEDEN



One of thirty-five
2,000-h.p. main-
line diesel-electric
locomotives supplied
to the Rhodesian
Railways by The
English Electric
Company Limited.

BAKER BESSEMER

TYRES · AXLES · SOLID WHEELS · DISC CENTRES · ASSEMBLED PAIRS OF WHEELS & AXLES

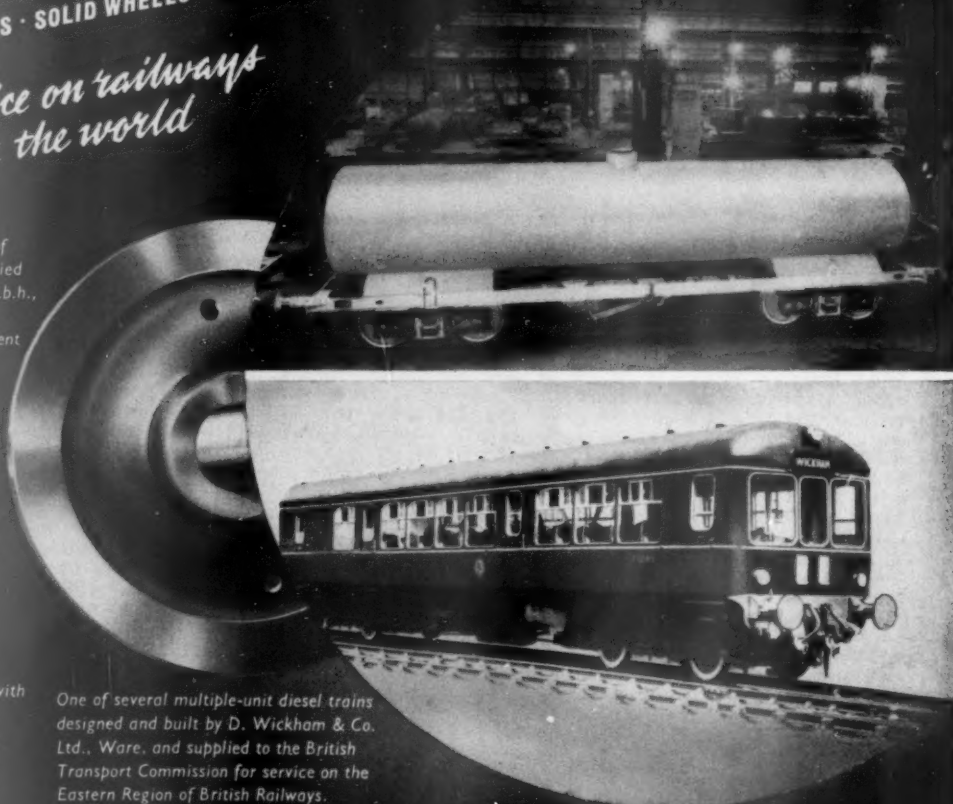
*in service on railways
all over the world*

One of a number of
tank wagons supplied
by Rax-Werk G.m.b.h.,
Austria, to the
Pakistan Government
Railways.



All the vehicles
shown are fitted with
Baker-Bessemer
wheels and axles.

One of several multiple-unit diesel trains
designed and built by D. Wickham & Co.
Ltd., Ware, and supplied to the British
Transport Commission for service on the
Eastern Region of British Railways.



JOHN BAKER & BESSEMER LIMITED

REGISTERED OFFICE: KILNHURST STEEL WORKS
TELEPHONE: MEXBOROUGH 2154.7 & 3793

G.P.O. BOX No. 3

ROTHERHAM

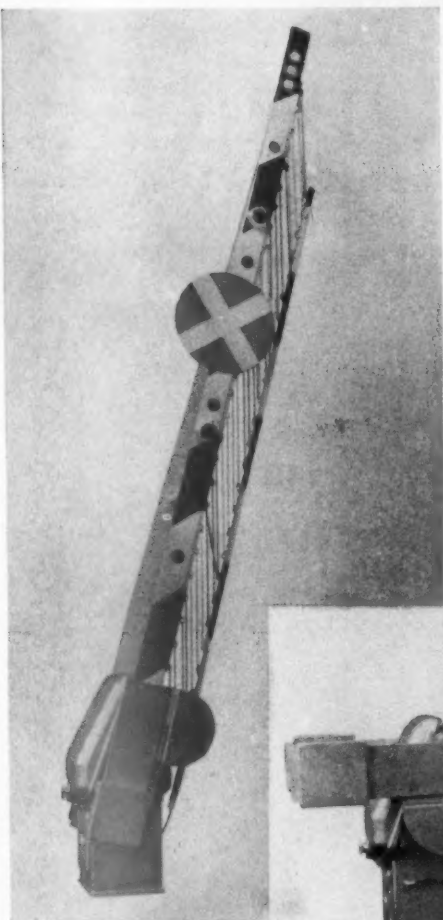
YORKSHIRE

TELEGRAMS: TYRES MEXBOROUGH

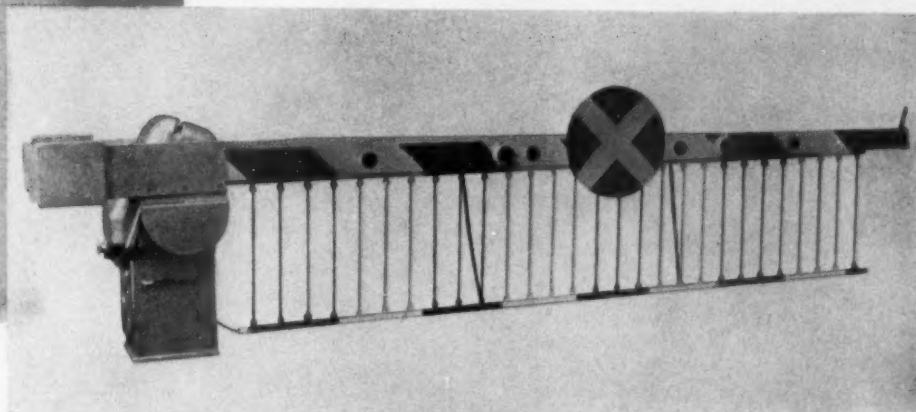
London Office: LOCOMOTIVE HOUSE, BUCKINGHAM GATE, LONDON, S.W.1 Telephone: VICTORIA 5278-9

INTEGRA SIGNALLING

Fully Automatic Lifting Barriers



Our first fully automatic lifting barrier scheme in this country has now completed 2 years successful operation...



Full width barriers for local and remote control, and half barriers for automatic control, in accordance with M.O.T. Specifications for Railway and Industrial use. Operation from 24v. D.C. or local A.C. supply.

HENRY WILLIAMS LTD

Telephone: RICKMANSWORTH 4321

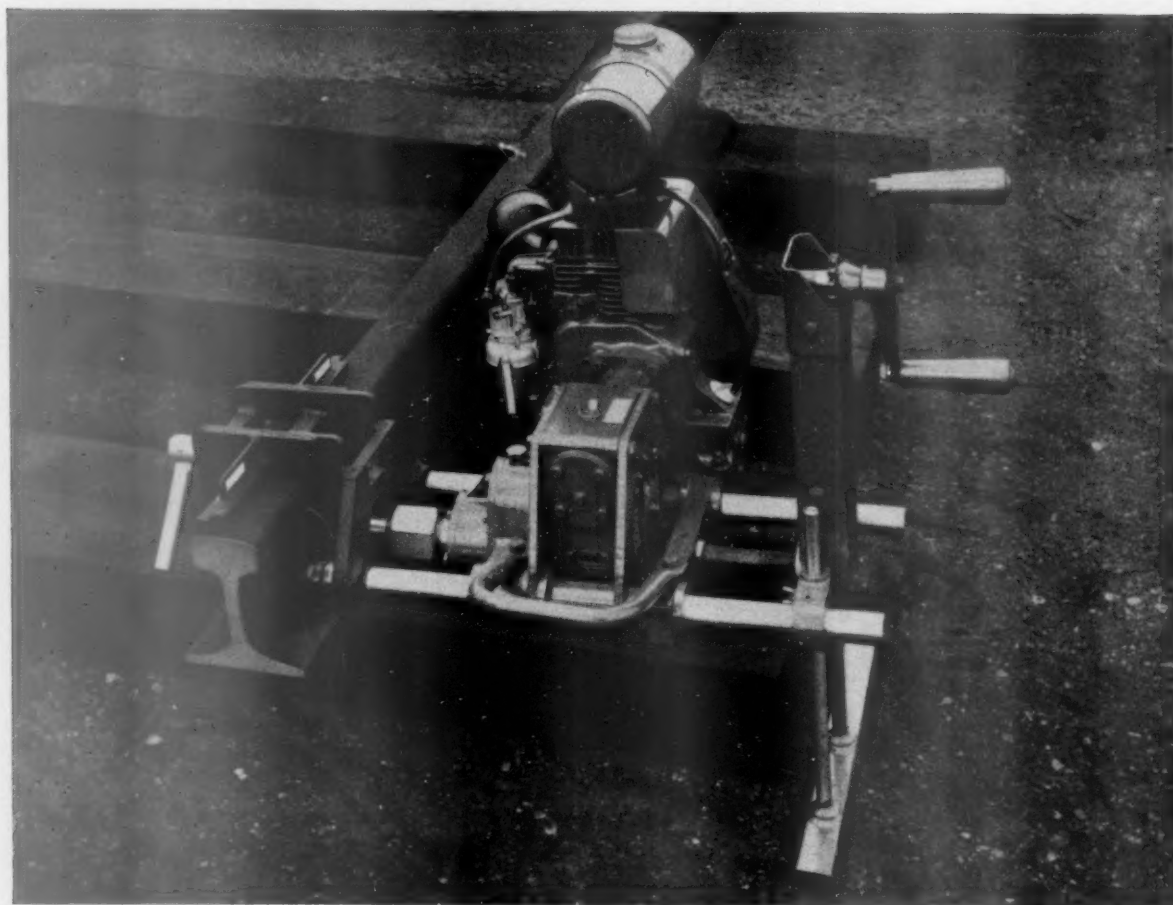


ELECTRIC SIGNALLING DEPARTMENT

WATFORD



1961 MODEL POWERED RAIL DRILL



By permission of the Chief Civil Engineer Eastern Region, British Railways

ABTUS LTD.

VANDON COURT, PETTY FRANCE,
WESTMINSTER, LONDON, S.W.1

Telephone: ABBEY 2312/3 Telegrams and Cables: ABTUS LONDON S.W.1

AUSTRALIA : DENMARK : INDIA & PAKISTAN : NORWAY : NEW ZEALAND : RHODESIA : SOUTH AFRICA



Extract from article in The Railway Gazette, June, 16th, 1961.

"FOR GOOD RUNNING ON THE PERMANENT WAY IT IS ESSENTIAL FOR THE LINE AND LEVEL OF THE TRACK TO BE MAINTAINED WITHIN FINE LIMITS. THERE IS NO SUBSTITUTE, SO FAR, FOR THE METHOD OF MANUAL MEASURED SHOVEL-PACKING TO PRODUCE FIRST-CLASS RESULTS FOR HIGH-SPEED TRAFFIC."

ABTUS TRACK ALIGNERS and Patented MEASURED SHOVEL PACKING EQUIPMENT



Photograph by courtesy of British Railways

ABTUS LTD. VANDON COURT, PETTY FRANCE, WESTMINSTER, LONDON, S.W.1

Telephone: ABBEY 2312/3

Telegrams and Cables: ABTUS LONDON S.W.1

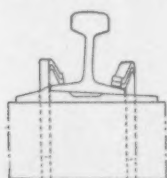
AUSTRALIA • DENMARK • INDIA • NEW ZEALAND • PAKISTAN • SOUTH AFRICA • SWEDEN



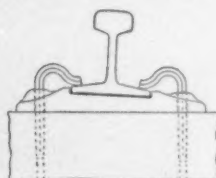
Reproduced by kind permission of the General Manager, Sudan Railways.

Elastic Rail Spikes give resilience to absorb vertical rail movement. Rail creep is resisted in both directions and track maintenance costs are reduced.

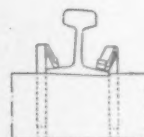
Designs are available to suit existing Track Construction.



Single Shoulder
baseplate



Double Shoulder
baseplate



Without
baseplate

ELASTIC RAIL SPIKE CO. LTD.

41-43, MINCING LANE, LONDON, E.C.3

Telephone: MINCING LANE 3222

Cables: ELASPIKE, LONDON, E.C.3.

The RAILWAY GAZETTE

INCORPORATING: THE RAILWAY ENGINEER • TRANSPORT • THE RAILWAY NEWS • THE RAILWAY TIMES • RAILWAYS ILLUSTRATED
HERAPATH'S RAILWAY JOURNAL (ESTABLISHED 1835) • THE RAILWAY RECORD • THE RAILWAY OFFICIAL GAZETTE

A Journal of Management, Engineering and Operation

VOL 115

FRIDAY AUGUST 4 1961

No. 5

CONTENTS

	PAGE
Editorial notes ...	121
Sir John Benstead ...	123
North Eastern Region Winter timetables ...	123
British Transport Commission traffic receipts ...	124
Water-side pitting of cylinder liners ...	124
Railway reorganisation in Argentina ...	125
Developments on C.I.E. ...	125
Letters to the Editor ...	126
The scrap heap ...	127
Overseas railway affairs ...	128
Microwave radio-telephone in the North Eastern Region ...	129
Wheel and axle production at Durgapur Steelworks ...	133
New Zealand travel centre ...	136
Lifting barriers at Barton Street in the Western Region ...	137
Mountain line for Mexico ...	138
Personal ...	139
New equipment and processes ...	141
News articles ...	143
Contracts and tenders ...	145
Notes and news ...	147
Railway stock market and official notices ...	148

Editor: B. W. C. Cooke, Assoc. Inst. T.

33, TOTHILL STREET, WESTMINSTER,
LONDON, S.W.1

Telephone: WHitehall 9233 (24 lines)

Telegrams: "Trazette Parl London"

Overseas telegrams: Trazette, London, S.W.1

BRANCH OFFICES

GLASGOW: 119, Bothwell Street, C.2 ... Central 4646

NEWCASTLE UPON TYNE: Cathedral Buildings, Dean Street, 1 ... Newcastle upon Tyne 22239

MANCHESTER: Century Insurance Building, St. Peter's Square ... Central 7667-8-9

BIRMINGHAM: 90, Hagley Road, Edgbaston ... Edgbaston 5454 (Three lines)

LEEDS: 70, Albion Street ... Leeds 27174

BRISTOL: 20, Victoria Square, Clifton ... Bristol 33873

Annually £5 by post ... Single copies, two shillings

Registered at the G.P.O. as a newspaper. ... Entered as second-class matter in U.S.A.



MEMBER OF THE
AUDIT BUREAU
OF CIRCULATION

outside the Treasury, would have been expected—rejection coupled with emphasis on the higher costs which will have to be met by their members as a result of the tax increases. If the Government is serious in its intention to promote export trade—and there is every reason why it should be—it will have to take far more definite action than endeavouring to curtail home consumption by price rationing. Any fall in total output—other things being equal—must raise unit costs. That in itself cannot fail to add to the disadvantage many goods suffer in overseas markets. If, additionally, the cost of financing exports is to be further increased—as is inevitable as a result of a higher Bank Rate—and credit even at the higher charge is to be made more difficult by the general credit squeeze—then one might be forgiven for coupling the Government exhortations to improve exports with its other notorious inanities such as “You have never had it so good” and “Export is fun.” Exporters of railway equipment and materials have never had it so bad, and any fun at the present time is probably being enjoyed by Britain's competitors. There is need for a complete re-thinking of the export problem by Government and by industry as individual units. This has been done already with striking results by a number of other industrialised countries and the effect is very clear in world markets.

Scope for expansion

IN THE railway equipment field alone there is obvious scope for a large expansion in British exports, given support, instead of frustration, by Government. Railways all over the world are constantly in the market for supplies ranging from locomotives and rails, to the smallest items of equipment. Every year millions of pounds worth of these supplies are put out to international tender. A far greater share of this valuable market could be secured by British manufacturers. It would be more fruitful if the Government were to offer a positive inducement to manufacturers to export by way of tax concessions on profits arising from business overseas than the negative raising of taxes on goods bought at home. Varying credit terms for export and home needs could also assist manufacturers willing to direct their efforts towards export sales. A strong, lively and imaginative approach to a fundamental national problem is essential.

I.L.E. golden jubilee

THE very full three-day programme arranged by the Institution of Locomotive Engineers to mark its golden jubilee, attended by His Royal Highness the Duke of Edinburgh, is reported and illustrated at length in the current issue of the Institution's Journal. Also included in this issue is the Sir Seymour Biscoe Tritton lecture, on the “Locomotive of the Future,” delivered by General Sir Brian Robertson, the then Chairman of the British Transport Commission who retired on June 1 and who has since received a Barony. Brief technical particulars are given of the many locomotives brought together for the exhibition, arranged by the British Transport Commission, at Marylebone. As would be expected the history of the Institu-

Economic affairs and exports

THE debate on the economic state of the nation, which followed the Chancellor of the Exchequer's July Budget, did nothing to remove the first impression that the measures he had taken and those he contemplated were once again designed to deal with the immediate rather than the long-term problem. Higher Bank Rate and purchase tax and a general credit squeeze no doubt will lessen the pressure on sterling and improve the balance of payments. They are unlikely to improve productivity and certainly will not aid exports. Unspecific talk of a five-year plan by Government and industry savours too much of pie in the sky to have aroused any enthusiasm among those industrialists on whom must fall the major effort of promoting sales overseas. So far as the appeal to trade unions to control wage claims is concerned, the reaction has been precisely what,

tion is covered; the first 40 years are described by Mr. H. Holcroft and the subsequent decade by Mr. E. S. Cox. We described the jubilee celebrations and published some notes on the Institution's history in our May 12 and 19 issues. The celebrations were very well organised; those taking part, who included many distinguished figures in the railway world, both from the United Kingdom and from overseas, will find the latest journal a reminder of the interesting and enjoyable events. Those who were not able to attend will obtain an excellent record of the outstanding celebrations.

Railway recruiting

THE British Transport Commission is offering jobs to school leavers obtaining "O" level education certificates with four subjects, including English and mathematics, at £100 a year more than the normal starting rates. The right people attracted to the industry—what then? Presumably this section of personnel is to be paid at the appropriate class-four clerical rate from 18 years of age until they reach the maximum age-rate scale at 28 years. It is during this critical period that the more intelligent and talented begin to have second thoughts, especially in the Provinces where promotion is not so readily achieved as in the London area. True, staff may sit the examination prescribed to allot Traffic Apprenticeships, of which the number is limited. Unfortunately, for one reason or another, much excellent potential is unsuccessful in the examination room, or at the subsequent interviews. Nevertheless, we applaud the innovation now introduced and suggest that thought should now be applied to methods of retaining through the critical ten years the resulting intake with interest unimpaired.

The commuter problem

"GREATER freedom to adjust schedules and fares is needed by the railroads." This statement is made by Mr. Wayne A. Johnston, President of the Illinois Central Railroad, in his latest message to key personnel on his system. Mr. Johnston particularly has in mind the commuter problem: he points out that studies made on the handling of commuters invariably conclude that automobiles alone cannot handle the intensive traffic which arises from a situation where millions of people work in town and live in the suburbs or country. He adds that it is becoming increasingly recognised that public carriers are essential if the heart of a city is to be kept alive; they must also be strengthened and expanded. There must be a change in the tax system; some Eastern states are moving toward tax relief or commuter railways. In particular, there must be a change in public understanding; if the great cities lose their railways, taxpayers will have to provide huge sums to provide substitute service.

Improvements to Port of Calcutta

THE World Bank is to lend the equivalent of \$21 million to the Commissioners of the Port of Calcutta. The loan will help to finance dredgers and other floating craft to maintain navigation on the Hooghly River approach, and provide equipment and works to improve efficiency. It will also finance the foreign exchange costs of a hydraulic study of the Hooghly River to help solve the problem of siltation in the river and to determine the feasibility of establishing a deepwater satellite port farther down the river at Haldia to accommodate bulk-cargo vessels. The volume of cargo now handled by the Port is 10 million tons a year. It is expected to increase by about 3 million tons over the next four years. The total cost of the equipment, study, and work covered by the project is estimated at about \$31 million. The loan will cover the foreign exchange requirements and local currency costs will be provided by the Commissioners of the Port of Calcutta. Equipment to be financed by the loan will be procured on the basis of international competitive bidding.

Victorian Railways electronic ticket counter

THE enterprise nowadays displayed by the Victorian Railways administration and staff is clearly shown in the active role electronics is playing in promoting efficiency on that system. Its electrical testing division is constantly engaged in research and development in this field. One of the latest examples is an electronic ticket counter designed by a young assistant electrical engineer on the railways. It is claimed that these electronic counters are capable of checking 6,000 tickets a minute, though at present required to count only 170 a minute. This counter is believed to be the first of its kind, and after exhaustive tests, the machines are being constructed in the V.R. electric testing laboratory; they will provide an infallible check on the 400,000 tickets turned out each week from the printing press. They will also instantly check the number of tickets against the serial numbers printed on the tickets, and will moreover register the numbers parcelled.

Bridgework in South India

AS ALREADY recorded in our Overseas columns, the Southern Railway of India is at present increasing the capacities of its trunk routes in all directions. Altogether some 244 miles of 5-ft. 6-in. gauge lines are being doubled, this work involving the construction of about 1,000 bridges, some of them large and with well-foundations 50 ft.-60 ft. below bed level. The difficulty of obtaining suitable steelwork has led to the adoption of pre-stressed concrete girder spans for the major bridges; 40-ft., 60-ft. and 64-ft. spans being standardised. Under existing broad-gauge tracks also bridges are having to be strengthened to carry additional loadings of heavier locomotives to move the ever-increasing traffic. Included in this category is the long Krishna River bridge near Bezvada, now known as Vijayawada. On the metre-gauge system also, some 46 spans of 150 ft. and 20 spans of 100 ft. are having to be regirded for the same reason. In the Pamban Viaduct, over 1,700 ft. of steel girders are being replaced with pre-stressed concrete because of excessive corrosion.

Indian railway research

THE Indian Railways Research, Design & Standards Organisation established in March, 1957, was described in our issue of August 19, 1960. In 1960 the Government set up a Central Board of Railway Research to advise the Ministry on the programme of research and development and to ensure co-ordination and co-operation with both other sister institutions and manufacturers. It consists of eminent scientists, engineers, and industrialists from all parts of the country. The National Research Stations and other allied organisations and their achievements are available at all times to undertake subjects of original research that railways would like studied. Close contact is maintained with leading manufacturers of railway equipment in countries all over the world, and railway officers are sent abroad to obtain first-hand knowledge of work being done in other countries.

Southern Region's electro-diesel locomotives

IN OUR last week's issue we published a brief description of the six electro-diesel locomotives being built in the Southern Region Works at Eastleigh (not Doncaster as was stated). The first of these is expected to be ready in October. The idea behind these locomotives, which had its origin in the Southern Region, is the solution of an outstanding problem—this is how, without electrifying a number of freight yards at great expense, to eliminate steam traction, to use the third rail where it is available and yet to work freight trains where there is no power supply. It was to meet this particular need that specifications and designs of these were worked out under the supervision of Mr. W. J. A. Sykes, Chief Mechanical & Electrical Engineer of

the Southern Region, by his staff at London Bridge and Brighton to the general requirements of Mr. J. F. Harrison, Chief Mechanical Engineer, and Mr. S. B. Warder, Chief Electrical Engineer, British Transport Commission.

Microwave radio-telephone system

THE pioneer work done by the North Eastern Region of British Railways, in introducing microwave radio-telephone communication between York, Darlington and Newcastle, is a development of great importance. The problem was economically and rapidly to augment the existing communication system. As explained in the article appearing elsewhere in this issue, a study of costs quickly established the benefits resulting from the British Transport Commission installing and maintaining its own equipment. Consideration of available methods was limited to cable and microwave-derived systems, telegraph-pole routes being ruled out due to their limitations. The decision to use microwaves was contributed to by the delay which would have unavoidably occurred in the laying of cables. When the radio system commences operation next year a total of 3,000 railway "subscribers" will be in contact with each other on a dialling basis. In addition to benefiting greatly the Region concerned, the experience gained in the operation of the system will be of much value when considering other installations. Efficient communications are essential to efficient railway operation. If efficiency can be coupled with economy, as in this application, the system becomes a particularly attractive one.

Plastics moulds for castings

AT THE British Railways Exmouth Junction Concrete Works, Exeter, where some 100 tons of concrete castings are produced daily, trials have been conducted with moulds made from Bakelite polyester resin, reinforced with glass fibre. Each of the moulds has produced over 250 castings and shows no sign of wear. A mould life of 2,000-3,000 castings is expected. Conventional timber moulds produce about 300 castings before requiring repairs. Because reinforced-plastics moulds are one-piece and have a hard surface, mould joins and surface damage, which normally scar concrete castings made in timber moulds, are eliminated. The advantages of plastics over metal moulds, which are also used for precast concrete, are: lighter weight, which facilitates stacking and speeds production, and easier removal of castings in cold weather. Items produced in plastics moulds at present include covers for cable conduit, concrete numerals, ornamental balustrades for the repair of a viaduct, and fencing posts complete with base plates.

Sir John Benstead

THE announcement that Sir John Benstead, Deputy Chairman of the British Transport Commission, is to retire in September marks a further stage in the reorganisation of that institution, and brings a little nearer the time when it will be superseded by the British Railways Board and the other bodies which are to be set up next year. The Government proposals on the reorganisation of the nationalised transport undertakings were announced towards the end of last year, and these made clear the intention to dissolve the Commission and to replace it by an entirely new structure.

Sir John Benstead has been a member of the Commission since its inception at the beginning of 1948 and has been Deputy Chairman since early in 1949. As an original member he has seen, and indeed has taken an active part in, all the vicissitudes through which that body has passed. He has been a railwayman since he joined the Great Northern Railway in 1911, and throughout his career has played an active part in both railway union and civic life. At the time of his appointment to the Commission he was General Secretary of the

National Union of Railwaymen, and his primary responsibility, apart from the more general duties of a deputy chairman, has been labour problems and labour relations.

The path of the poacher turned gamekeeper can never be easy, and, indeed, there have been many who have criticised the placing of labour responsibilities on the shoulders of one who had spent so much of his life and given so freely of his energies to the cause of the unions. That decision was not one of Sir John Benstead's making, and for him it must be said that his cautious, thoughtful and urbane approach and his wide knowledge of union customs and procedures cannot have failed to be of great service to the Commission. His task has been difficult, and in the discharge of his duties there must have been many occasions when his patience has been very sorely tried, although this has never been apparent. Not a year has passed since his appointment when the direct calls on his time and skill have not been many. No one could have occupied the position he held without incurring criticism from those who felt that they should have been better off—that is the fate of everyone who has to deal with matters of this kind. Nevertheless, in the closing days of his career he serves as an example of what can be achieved by one who started low in the railway scale and by diligence and application attained a respected position at the summit.

North Eastern Region winter timetables

FIRST of the winter timetable books to make its appearance this year is that of the North Eastern Region. Its most outstanding improvements are those to be shared with the Eastern Region by the introduction of "Deltic" 3,300 h.p. diesel locomotives to the East Coast Route and the Kings Cross-Leeds service. This is a foretaste only of the complete accelerated service which will come into force next year, when all these units have been received and thoroughly run in; but the limited accelerations introduced in the winter book are of a remarkable description. During the past summer they have been preceded by the speed-up of the northbound "Aberdonian," which had 54 min. cut from its London-Edinburgh time, now 7½ hr., with a load permitted to total 530 tare tons from Kings Cross, and 455 tons from York. Load notwithstanding, this express shares with the "Talisman" the fastest timing of the day from Newcastle to Edinburgh, 124.5 miles in 126 min.

In the southbound direction the train selected for high speed running with "Deltic" power is the first morning express from Newcastle, at 7.50 a.m., of which the time from September 11 will be cut by 59 min. to 4½ hr. for the 268.4 miles. From Darlington the 232.3 miles to Kings Cross will be run in 3 hr. 28 min., at 67 m.p.h., 10 min. more than the time of the pre-war "Silver Jubilee" but with a considerably heavier load.

This improvement will permit cancellation of the short-lived "Tees-Thames" through express from Tees-side to Kings Cross, for passengers will be able to leave Saltburn and Middlesbrough at 7.25 and 7.59 a.m. respectively, instead of the present 7.5 and 7.40 a.m., change at Darlington, and be in London 15 min. earlier, at 12.5 p.m. The present "Tees-Thames" departure from York at 8.48 a.m. for London will be replaced by a new 9.16 a.m. up, calling at Doncaster and reaching Kings Cross at 12.56 p.m.

In the northbound direction the present 2 p.m. "Tees-Thames" from Kings Cross is to run to Newcastle instead of Saltburn, arriving at 7.17 p.m. This, with the alteration of the 3.10 p.m. departure to 3 p.m. will complete an unbroken sequence of express trains at the even hours from Kings Cross to Newcastle from 8 a.m. (the morning "Talisman," 10 min. earlier than now) to 4 p.m., except at noon, when the departures will still be the "Queen of Scots" Pullman at 11.50 a.m. and the "Northumbrian" at 12.20 p.m.

In the Leeds and Bradford area the principal changes are those affecting the "West Riding" in each direction, the down "Yorkshire Pullman" and the early evening Leeds to Kings

Cross service. The 7.30 a.m. up "West Riding" will attach its Bradford portion (7.5 a.m.) at Leeds Central instead of Wakefield, and will be non-stop from Wakefield to London, arriving 36 min. earlier, at 10.30 a.m., in 3 hr. from Leeds. The down "West Riding" at 7.45 a.m. from Kings Cross, omitting its stops at both Doncaster and Wakefield, will be accelerated 35 min., reaching Leeds at 10.54 a.m., and Bradford (via Leeds) at 11.21 a.m. The down "Yorkshire Pullman," at 5.25 instead of 5.20 p.m. from Kings Cross, will reach Leeds at 8.40 p.m., Bradford at 9.6 p.m., Harrogate at 9.20 p.m. and Hull at 9.3 p.m., accelerations of 33 min. to Hull and 38 min. to the other three cities. The 5 p.m. from Bradford is to leave Leeds 3 min. earlier, at 5.29 p.m., call at Retford instead of Peterborough (also at Wakefield and Hitchin as now) and be accelerated 48 min., to arrive in London at 8.42 p.m.

As to other West Riding changes, the 7.52 a.m. from Leeds to London will start at 7.42 a.m., and be diverted to call at Wakefield Kirkgate instead of Westgate, there attaching a through portion from Halifax (7.15 a.m.) and Huddersfield (7.41 a.m.); arrival at Kings Cross will be 8 min. later, at 11.55 a.m. In the down direction the 3.40 p.m. from Kings Cross will be brought into line with the hourly Leeds departures by starting at 3.20 p.m., and will call additionally at Doncaster. The reverse through working from London to Huddersfield and Halifax will be by the 1.20 p.m. from Kings Cross, which like the corresponding up train will be diverted to stop at Wakefield Kirkgate instead of Westgate. This is but one of a number of improvements which have been effected under North Eastern Region auspices in the service between London and Huddersfield; in addition to the through coaches just mentioned, diesel train connections will now run between Huddersfield and Wakefield Westgate (reversing at Kirkgate) in connection with three up and two down London expresses, the 7.12 a.m. from Huddersfield will be in connection with the accelerated up "West Riding," and the time of 3 hr. 18 min. so given from Huddersfield to London will be the fastest on record.

Few other changes have been made in the North Eastern Region. One of these is the restoration, after a lapse of a number of years, of refreshment service to five trains in each direction of the hourly service between Newcastle and Middlesbrough, in the form of miniature buffets.

B.T.C. traffic receipts

THE British Transport Commission four-weekly traffic receipts show that British Railways passenger receipts

	Four weeks to		Incr. or Decr.	Aggregate for 32 weeks to		Incr. or Decr.
	July 16 1961	July 17 1960		July 16 1961	July 17 1960	
	1961 £000	1960 £000		1961 £000	1960 £000	
Passengers—						
British Railways ...	14,389	14,692	- 303	80,869	77,459	+ 3,410
London Transport—						
Road passenger services ...	4,600	4,503	+ 97	31,472	30,381	+ 1,091
Railways ...	2,110	1,968	+ 142	15,041	13,768	+ 1,273
Provincial & Scottish Buses ...	5,762	5,540	+ 222	33,686	31,839	+ 1,847
Ships ...	1,028	984	+ 44	3,434	3,262	+ 172
Total passengers ...	27,889	27,687	+ 202	164,502	156,709	+ 7,793
Freight, Parcels & Mails—						
British Railways—						
*Merchandise & livestock ...	7,655	7,827	- 172	55,236	55,009	+ 227
*Minerals ...	3,405	3,778	- 373	25,074	26,608	- 1,534
*Coal & Coke ...	7,433	7,416	+ 17	57,524	59,085	- 1,561
*Parcels etc. by coaching train ...	4,336	4,508	- 172	29,732	29,733	- 1
*Others ...	5,180	4,602	+ 578	34,201	31,287	+ 2,914
Total freight, parcels & mails ...	28,009	28,031	- 22	201,767	201,722	+ 45
Total ...	55,898	55,718	+ 180	366,269	358,431	+ 7,838

*Includes receipts from collection and delivery, etc.

†Receipts from railway movements wholly within dock areas, included in previous periods under "Freight, Parcels and Mails," are now classified as miscellaneous.

were down again to the tune of £303,000 for the four weeks ending July 16, one of the peak holiday periods, as compared with the same period last year. For four weeks ending June 18 there was a drop of £462,000, part of which could be attributed to the inclusion of the Whit holiday period in 1960. This month there can be no doubt that passenger receipts are declining, the Whit holiday figures do not affect the relevant period in either year. The freight position too does not give a happy picture, merchandise & livestock traffic was down £172,000, minerals down £373,000, and parcels down £72,000. Coal & coke traffic increased by £17,000 but, compared with the previous period this year, it would appear that this increase is only temporary and this traffic too will show a falling off.

PERCENTAGE VARIATION 1961 COMPARED WITH 1960

	Four weeks to July 16 1961	28 weeks to July 16, 1961
British Railways—		
Passengers ...	+ 2.0	+ 4.2
Parcels ...	- 1.6	-
Merchandise & livestock ...	- 2.1	+ 0.4
Minerals ...	- 9.8	- 5.7
Coal & Coke ...	+ 0.2	- 2.6
Total ...	- 2.0	+ 1.5
Ships, passengers ...	+ 4.4	+ 5.2
British Road Services, Inland Waterways & Ships (cargo) ...	+ 12.5	+ 9.3
Road Passenger Transport, Provincial & Scottish ...	+ 4.0	+ 5.8
London Transport—		
Railways ...	+ 7.2	+ 9.2
Road Services ...	+ 2.1	+ 3.5
Total ...	+ 3.6	+ 5.3
Aggregate ...	+ 0.3	+ 2.1

Water-side pitting of cylinder liners

PITTING has been a problem with which hydraulic engineers have always had to contend. For many years it has been associated with turbulence, and certain conditions of pressure, speed, and temperature, among other causes. The water-side pitting of diesel cylinder liners has also received considerable attention, but as yet no final solution of the problem has been reached. The matter formed the subject of a paper, recently presented to the Diesel Engineers & Users Association, by Mr. H. H. Collins, of the British Cast Iron Research Association, which has now been published.

Mr. Collins commenced by pointing out that the rate of the pitting attack, and the size, shape, and distribution of the pits, vary appreciably from engine to engine, even of the same type, and often even from liner to liner in the same engine. It was explained that many different theories have been advanced to account for the rate and distribution of the attack, mostly with little conclusive evidence to support them. They may be divided into two groups, those which postulate that the pitting is caused by the mechanical phenomenon of erosion, and those which conclude that it is due to the chemical phenomenon of corrosion, although each group normally regards the alternative phenomenon as playing some minor part in the process.

Considering the theories put forward, it was pointed out that all of those which imply a mechanical contribution to the pitting attack derive the mechanical force from the effect frequently observed in fast-flowing or turbulent liquids and known as cavitation. Assuming that the pitting is caused by a corrosion process, the highly-localised nature of the attack suggests that it has been caused by the development on the liner surface of small areas whose electrode potential is appreciably less noble than that of the bulk of the liner surface, which in consequence has stimulated pitting at these sites. Several theories have been advanced to account for this and they were considered by the author in two groups, comprising those which are based on the presence of cavitation in the coolant, and those which are based on the variations in the rate

of coolant flow through the waterways of the engine.

Summing up the available evidence on the mechanism of pitting, it was said that it seemed certain that a contributory cause is the production of very turbulent coolant flow conditions, adjacent to the liner surface, by the high-speed vibration of the liner walls. The turbulent flow promotes the development of small sites whose potential is more anodic than the rest of the liner surface, rather than causing mechanical damage to the liner. In brief, the pitting is caused by a corrosion process and not by an erosion process. The exact mechanism is still in doubt.

Considering methods available for reducing pitting attack, it was said that assuming that the source of the pitting is the development of high-frequency vibrations of relatively large amplitude in the liner, it is clear that the most practical way of reducing the trouble would be to introduce design modifications which might be expected to eliminate or reduce the vibrations. Several workers have demonstrated that the cause of the vibrations of maximum amplitude is piston slap and it has been shown that the reduction of piston clearances in the cylinder is effective in reducing pitting, and also reduces the amplitude of vibration of the liner wall very considerably.

Modifications to the design or material of the liner itself would increase its stiffness and would decrease its amplitude of vibration. Since there is some correlation between this and the incidence of pitting, this might be expected, Mr. Collins explained, to reduce the degree of pitting attack.

It is possible, it was stated in conclusion, that the use of irons of increased modulus of elasticity, or of increased corrosion resistance, may be beneficial. Nickel-chromium plating and corrosion inhibitor's have also been reported to be effective in some cases.

Railway reorganisation in Argentina

THE recently outlined Government plan for the reorganisation of the railways in Argentina is already taking shape in the form of a number of decrees. One of them abolishes all the superintendents and their staffs and creates a new board of directors consisting of a President and Vice-President appointed by the Executive Power, two members representing the men's unions, and the six administrators of the different lines. A number of advisory committees will be set up, composed exclusively of railway technicians, the acceptance of whose recommendations will be obligatory in a number of cases.

Another decree calls for the reorganisation of the Transport Secretariat, where a number of sections will be suppressed—including the National Railway Board—and their functions, where necessary, transferred to the individual railways or to E.F.E.A., the State Railways administration. A 30 per cent reduction in staff is also being enforced. A third calls for the immediate superannuation of 16,000 employees, who will receive an indemnity and also the payment of 75 per cent of their present salaries or wages during the period in which their superannuation payments are being calculated.

A new committee is to be formed with representatives from the Ministry of Public Works and Services, Ministry of Labour and Social Security, Transport Secretariat, E.F.E.A., and the two men's unions. It will deal with all requests for betterment of wages, salaries and working conditions, and will make recommendations for the complete overhaul of present railway regulations, with the object of facilitating greater efficiency and elasticity and, as a consequence, increased productivity. Other decisions provide for the sale of all property not essential to railway operation; a 50 per cent reduction in the number of official motor-cars; the conversion of 32 official coaches to public service; and the fixing of tariffs for the carriage of mails by rail.

There has been a change in the official attitude towards increases in rates and charges. It has now been definitely decided that as from August 1, goods and livestock rates will be increased by 25 per cent, and main-line passenger fares by 40

instead of 50 per cent as was originally planned. No change will be made for the time being in suburban passenger fares in view of the poor state of the services offered. The Minister of Public Works and Services was called before the Senate in order to explain fully the Government's railway policy; it was approved in general by that body.

The Transport Secretary, Eng. Belzoni; the Under Secretary, Eng. Vela Huergo; and the Delegate in charge of E.F.E.A., Eng. Cadot, all resigned in order to facilitate the execution of the Government's plan of action. Eng. Acevedo, Minister of Public Works and Services, personally took over the posts of Transport Secretary and Delegate in charge of E.F.E.A., while the Under Secretary, Dr. Juan Ovidio Zavala, took over additionally the functions of Under Secretary of Transport.

Meanwhile, opposition continues to be encountered from all sectors, particularly against the closing of branch lines, transfer of services to private interests, and sale of surplus property. Rolling stock repaired by private firms cannot be placed in service because railway staff refuse to handle it, and a 24-hr. strike as a mark of protest against the measures already announced was cancelled.

Finally, it has been definitely decided to close the following branches: Vedia-Pergamino, General Villegas-Patricios, Empalme San Carlos-Galvez, and Roversi-Campo del Cielo on the General Belgrano Railway; and General Lorenzo Vinter-Coronel Francisco Sosa on the General Roca Railway.

Developments on C.I.E.

MR. PATRICK MURPHY, Area Manager, Galway, Coras Iompair Eireann, has announced a plan for major improvements aimed at providing a fully-integrated transport system and the best possible facilities and amenities for public and staff. The establishment of an area headquarters in Galway, and the increasing importance of the city as a transport centre make necessary the provision of additional accommodation for passenger and freight services as well as extra offices for area staff. The work covers a new passenger platform at the station; new railway sidings and roadways for freight; improved staff dining and restaurant facilities; new office accommodation, and a modern telephonic and telegraphic communication system.

The passenger platform has been completed and is in use. Finishing touches are now being given to its surroundings. The construction of this platform means that over 1,000 passengers can now be dealt with at one time. It also allows C.I.E. to provide a more efficient service for the expanding tourist traffic in Galway and for excursion trains to sports fixtures and other events. The platform has also helped efforts to reduce running times for trains; the schedule for three passenger trains has been cut, and scheduled running time of the afternoon train from Limerick to Galway has been cut by 30 min., the afternoon train from Galway to Dublin by 15 min., and the morning "Cu-na-Mara" express from Galway to Dublin by 5 min. It has also improved the appearance of the railway station: the old building previously occupying the site has been demolished, and incoming railway passengers now have an uninterrupted view of the clean modern station and office buildings.

The railway goods sidings and roadways will be constructed in the field adjoining Lough Atalia Road, from which a wide entrance gateway will be provided. The sidings are designed to cater for wagon-load traffic such as fertilisers, cement, grain, and sugar, and will permit the quick transfer of these commodities from rail to road vehicles. The separate entrance to the sidings will relieve traffic congestion in Eyre Square and in the approaches to the existing railway goods station. The sidings and roadways are planned for completion in time for the heavy seasonal movement of fertilisers next Spring.

Also to be undertaken in the near future is the improvement and renovation of the dining and rest-room accommodation for road passenger staff. The new administrative offices will

accommodate the Area Management staff, and the first section of these to meet immediate needs was completed early this year. The erection of a communicating office block will be put in hand within the next few months. This will be a three-storey building of modern design overlooking the approach road to the passenger station, and will be visible from the north side of Eyre Square. Over 50 staff will be accommodated, including engineering, operating, sales personnel and accounting personnel. The Galway District Manager's office will be in the same building.

The extended telecommunication system being planned will give control of operations in the Galway Administrative Area, which extends eastward to Mullingar and Longford and northward to Donegal. A teleprinter to be installed within the next few weeks will be linked directly with Athlone and with the Central Traffic Control Office at Amiens Street, Dublin. Telephone lines will be added to the present network and, with the use of selective ringing and switching arrangements, quick communication will be available, not alone within the Galway area but also with centres throughout the entire C.I.E. system.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

HOW SHORT IS YOUR RAILWAY?

July 17

SIR, The "Scrap Heap" paragraph in your issue of June 23—"Angels' flight railway"—states that this Los Angeles line claims to be the world's shortest. The steep-grade railway in Dubuque, Iowa, built in 1882, claims to be the "world's steepest and shortest." It is 296 ft. long, compared with the 315 ft. of the Los Angeles line. The fare is 5 cents.

Yours faithfully,

CHARLES E. LEE

2, Duke's Road,
Tavistock Square, W.C.1

RAILWAYS INTO ROADS

July 8

SIR, In the field of passenger traffic, the railway conversionists appear to argue on the basis of 500 60-seat buses per hour per lane, giving 30,000 seats an hour. If this can be done, or is being done, on a new motorway, then let it continue; but as the same capacity can be achieved by 30 trains an hour, each with 1,000 seats, what is the object of the conversion? Assuming one driver and conductor per bus, and one driver and guard per train, the conversion would require a travelling staff 17 times that required by rail. This in the light of modern conditions would be a retrograde step. The money would be spent to much more useful purpose by increasing present rail capacity to, say, 40 trains an hour each with 1,500 seats, giving 60,000 seats per hour per lane, and this need not be the limit.

In the case of freight, "Benbow" refers in your issue of July 7 to the use of road semi-trailers as temporary storage units; but a road truck hauling one of these vehicles can hardly be compared to a railway engine hauling, say, 50 wagons giving a staff ratio of 25 to one in favour of rail.

In the past, ingenious schemes have been evolved for dealing with rail wagons by remote control, and with new techniques the scope is considerably widened. A mass-production industrial enterprise often requires several years to pass through the various stages of drawing-board, design, testing, re-design, gradual introduction, and so on before full-scale usage, during which time no return is obtained on the capital; and it is unrealistic to criticise an enterprise on these grounds during the preliminary stages.

A 68-m.p.h. 24-ton lorry gives an output of 1,632 ton-miles per driving hour, and a 53-ton lorry a proportionate figure; but both compare poorly with the 60,000 of a 1,000-ton train at 60 m.p.h. In other countries, modern practice is to use freight trains of 4,000 tons, giving a staff ratio of 40:1 in favour of rail, and this is not the limit. In the post-war era, whenever mass-freight problems have been passed to consultants, the verdict has usually been in favour of rail as the high output per driving hour has been such as to give a better return on the capital; there have been several such cases in Africa, India, Canada, and elsewhere.

The principle of the flanged wheel on the steel rail enables

high outputs to be obtained per unit of manpower, time, or material, which are essential in the conveyance of bulk commodities; but in addition the success of the new British freight expresses indicates that door-to-door transits will not be the exclusive possession of road transport in the not-too-distant future.

Yours faithfully,

A. W. T. DANIEL

3 Hall Way,
Purley, Surrey

ROADS INTO RAILWAYS

July 31

SIR, It occurs to me that there are official answers to the comparative carrying capacity of rail and road of similar width of formation. (1) In urban development London Transport, as much committed to road as rail and therefore unbiased, prefers a railway tube across London (the Victoria Line), with stopping trains every 40 seconds, to a road development of similar carrying capacity. (2) The people investigating the Channel Tunnel prefer a main line railway, with 90 m.p.h. trains every four minutes, because more road vehicles could be ferried through the tunnel by train per hour than could go through on their own wheels. Only the safety of rail guidance can allow maximum use of space and minimum clearance to lineside structures and passing vehicles. To the safety of rail guidance we must add the safety of the space interval used in railway signalling. Road transport will always be prolific in loss of life by comparison, because it cannot effectively eliminate the human element; it is also prolific in its need for personnel because while the adoption of modern techniques is enabling the railways to reduce the numbers on their payroll, road hauliers by transporting in penny numbers need far more men to carry the same load. A West German technical publication has recently put this matter of cost of vehicles and fuel very succinctly:

"One horse-power moves 150 kg. by road or 500 kg. by rail.

"One thousand tons of freight needs 50 lorries and 100 men by road or 50 wagons and three men by rail.

"Road vehicles cost 3,000,000DM each and last ten years, rail wagons cost 750,000DM each and last 30 years."

The reason why people have to stand in trains to and from work in London is simply that they all start work at the same time, and all want to catch the same train. If we turned over to buses (even now London Transport cannot get enough drivers) the result would be worse; everyone would want to catch the same bus. The writer travels to London daily, 17 miles, in the overall time of 40 minutes, home door to office door, including 12 minutes walk to the station. There is a comfortable seat in the train both ways.

Yours faithfully,

R. G. R. CALVERT

45, Woodwaye,
Oxhey, Watford

The Scrap Heap

Veterans restored...

After careful restoration to their original condition at British Railways' North Road Locomotive Works, Darlington, two historic locomotives *Locomotion No. 1*, and *Derwent* are back on their plinths at Darlington Station. The accompanying illustration shows *Locomotion No. 1*. This locomotive was built in 1825 by Robert Stephenson & Company at the Forth Street Works, Newcastle, and hauled the first passenger train in the world on the Stockton and Darlington Railway on September 27, 1825. It served the Railway till 1841 and then became a colliery pumping engine. *Derwent* was put into service in 1845 and was presented to the North Eastern Railway Company for preservation in 1898.

...and in service

On July 28, British Railways delivered to Welshpool the locomotive No. 822 *The Earl*. This locomotive built in 1902 has been overhauled and will be accompanied by seven Pickering 10-ton bogie wagons and two 40-seat passenger carriages. *The Earl* will be used on the passenger trains of the Welshpool and Llanfair Light Railway Preservation Co. Ltd., and scheduled services will commence next Whitsun.

Like poles repelled

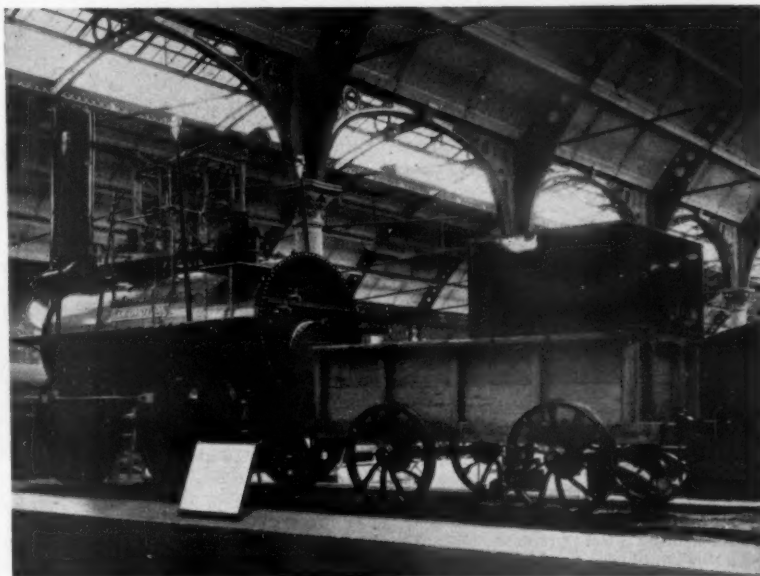
In 1920, although the net liabilities of the British railway system falling on the Exchequer was about £54 million, Poland contemplated asking Britain to run its railways. Conversations were held between Sir Percy Loraine, the British Minister in Warsaw, and Prince Sapieha, the Polish Foreign Minister, but the proposal was bogged down in the intricacies of the British financial system. Eventually it was abandoned when the "Curzon Line" and the "Danzig Corridor" political expedencies were adopted.

Doric arch: Gallic comment

In connection with the announcement that the famous Doric Arch at Euston Station is to be demolished, a correspondent to *The Times* recalls the comment of a French visitor, who, being called upon by his English host to admire the arch, replied: "C'est magnifique, mais ce n'est pas la gare."

Battersea beach

Two Frenchmen alighted from a train at Victoria the other day and inquired of



"Locomotion" restored to its plinth at Darlington Station after a complete overhaul at Darlington, North Road, Locomotive Works

the astounded ticket-collector: "How far is it to the beach?"

He looked at their tickets, saw that they had booked from Brighton to Bognor, and gently explained that they were in the wrong town. The tourists were unconvinced.

"But monsieur," they said, pointing back along the line towards the river, "we just saw the sea from the train."—From the "Evening Standard," July 27.

Ash ejectors

The fitting of ash ejectors was never a wide-spread practice in Britain. Steam intermittently turned into perforated pipes, housed in the bottom of the smokebox, agitated the ashes sufficiently to entrain them with the blast. Aural evidence of the device being in action was usually forthcoming in the form of a rain of cinders on the carriage roof and woe betide anyone who had their head out of the carriage window. The ejector was regarded by some enginemen as a weapon to be used against platelayers (as the permanent-way maintenance personnel of the period were styled), and dilatorily getting out of the way was apt to bring down a rain of ashes on their heads. The same treatment was unwittingly meted out to passengers, waiting on a platform, in the early years after grouping. A "foreign" engine in Scotland had the ejector operated in error by a fireman who mistook the wheel valve for that

controlling steam to the injector. Ash ejection still continues but the provision of self-cleaning smokeboxes made the process a continuous one which today passes unnoticed.

Mexican railway hero

The stamp illustrated was issued in Mexico in 1957, to commemorate the action of an engine driver, Jesus Garcia, 50 years before, who gave his life to prevent a disaster. Garcia was driving the engine of a freight train carrying explosives when one of the wagons caught fire. He ordered his fireman to



Mexican Railway Stamp

jump clear and stayed with his engine to take the train clear of the town of Nacozari. The dynamite blew up before he could make his own escape. The town was later renamed Nacozari de Garcia in gratitude.

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

SWEDEN

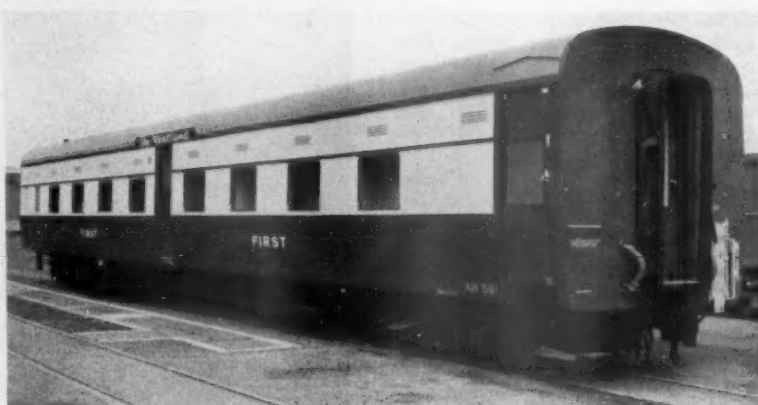
Unremunerative railways

Several railways in Sweden are unremunerative and the State Railways administration is conducting enquiries to enable it to decide which must be closed and which should be retained to meet public requirement. In Sweden lines that are worked at a loss are not embarrassments to the State Railways as the Government makes good the losses. Many of the unremunerative lines are of narrow gauge and some have to be closed entirely, but others of any importance have to be converted to standard gauge. One at present being converted is the Mariestad-Gaardsjö railway, but it is expected to be re-opened to standard-gauge traffic in a month's time. The next to be converted is the Forsheim-Mariestad line—this should be working as standard gauge by July, 1962. Two other lines, the Kalmar-Torsås and the Karlskrona-Gullgerga-Torsås-Bergkvara—are to be closed. Further investigations of similar nature are proceeding.

WESTERN AUSTRALIA

Improved coaching stock

The first of six first-class sleeping cars used on the "Westland," the Western



Rehabilitated first-class sleeping car for the "Westland" interstate service, Western Australian Government Railways

Australian 3-ft. 6-in. gauge link of the interstate service between Western and Eastern Australia, has been modernised and is in service. The other five will be completed and in service before the Commonwealth Empire Games, to be held in Western Australia in November, 1962. Improvements include sponge-rubber mattresses, new upholstery, and wall-to-wall carpet.

The first coach, illustrated above, has been decorated in blending pastel shades of blue, pink, and primrose. Different

colour schemes will be provided in each coach.

As a result of the investigations in hand in connection with the conversion from 3 ft. 6 in. to standard gauge, the construction of two proposed "Westland" sets for this run has been cancelled. If the standard gauge is approved, interstate and local traffic between Kalgoorlie and Perth will be carried throughout on standard-gauge without change of passenger and rolling stock as between the different railway systems. New stock on the 3 ft. 6 in. gauge may then be surplus to requirements. Meanwhile, modernisation of existing stock will provide the desired improvement in travelling comfort.

RUSSIAN FREIGHT WAGONS



Models of Russian 100-ton and 120-ton freight cars

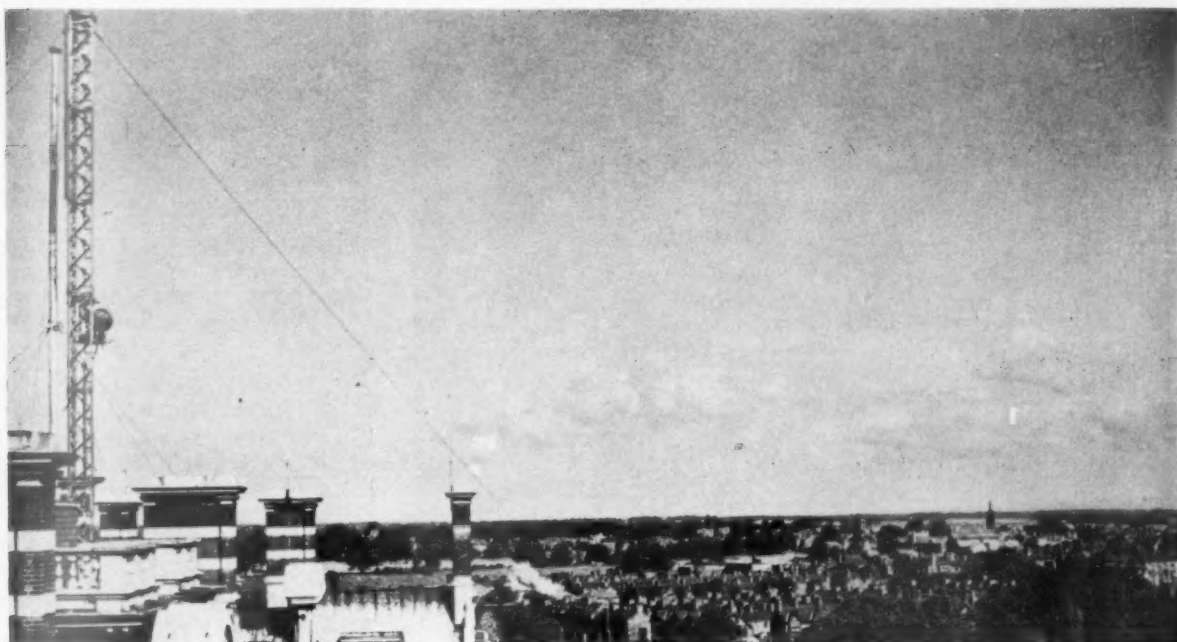
FINLAND

Extension of dieselisation

This year, the introduction of the European summer timetable took place on May 28. Though there are no great changes, speeds on some sections have been accelerated and new connections have been established. Diesel traction will play an increasing role,

Increasing dieselisation

Most Finnish rail passenger traffic is now diesel powered. In 1960 about 72 per cent—measured in train-kilometres—of the passenger trains used diesel traction. At present the corresponding figure is about 75 per cent. In freight traffic the figure was a little below 14 per cent last year.



Propagation testing from top of Headquarter offices, York

MICROWAVE RADIO-TELEPHONE in the North Eastern Region

THE North Eastern Region of British Railways has taken a big step forward with the introduction of a microwave radio-telephone system between York-Darlington and Newcastle.

Overhead or underground

For over 123 years the railways in this country have employed overhead wires or underground cables over which to conduct their internal telephone and telegraph business, but present trends, coupled with the drive to modernise, necessitate an "on demand" communication system which can only be achieved by an increase in the capacity of the trunk circuits and the introduction of subscriber trunk dialling facilities between the main administrative centres of British Railways. This could be accomplished by renting circuits from the Post Office, installing cables along the track side, or using the ether or continuum by means of microwaves to link together the railway-owned and maintained automatic telephone exchanges. Consideration had to be given to future developments in the form of computer facilities for wagon reporting, accountancy, and storekeeping, and also industrial television applications.

A study of costs quickly revealed that it would be to the advantage of the Commission to install and maintain its

own trunk equipment in place of hiring Post Office circuits. The comparative annual charges, taking into account interest on capital, maintenance, renewal, and other running costs, were found to be of some 1:6 ratio, this being based on current Post Office Statutory Instrument Charges. Attention was turned, therefore, to a detailed study of the economics of cable and microwave-derived systems—overhead telegraph-pole routes being excluded because of their limitations in trunk carrying capacity, susceptibility to storm damage and other technical factors governing the standard of speech quality.

Relative merits considered

When considering the merits of cable versus microwaves it was essential to compute on the basis that transmission quality and freedom from interfering signals, known as "overall equivalent" and "signal to noise ratio" would meet

A pioneer scheme in the modernisation of main-line trunk telephone and telegraph networks

by **P. W. HANSTOCK**, Assistant to Chief, Signal & Telecommunications Engineer (Telecommunications), Chief Signal & Telecommunications Engineer's Department, North Eastern Region, York

the demands of the longest circuit likely to be used as a through trunk circuit on British Railways.

A figure of 750 miles was considered to be typical of the longest trunk connection likely to be made.

Microwave cheaper

Estimates showed that for the 80-mile overall route between York and Newcastle annual charges were higher for the various types of cable schemes considered than for a microwave system. It was decided therefore to proceed on the basis of microwaves, particularly as the laying of a cable duct route along the track side would be unavoidably delayed as a result of the considerable amount of civil engineering and modernisation works being carried out along the lineside in respect of bank trimming, drainage, and track improvements.

Communication is achieved by a series



York headquarters offices, trunk switching equipment

of transmitters and receivers working into "dish-like" aerials, positioned along the route. Each of the aerials concentrates the radio signal into a very narrow beam rather like a searchlight. As the radio signal behaves in a similar way to ordinary light waves the radio beam normally cannot be bent around the curvature of the earth. To cover long distances, it becomes necessary to mount the "dishes" on tall towers, high buildings, high ground, or a combination of all three. The "dishes," whose surfaces follow the law of the parabola, are generally constructed in metal, their diameters ranging from 6-12 ft. The concentration of energy by the paraboloidal "dishes" is so great that distances of up to 40 miles can be covered with as little aerial power as 1W.—less than the average flash-lamp bulb. Frequencies generally employed range from 1,000 million to 10,000 million cycles per sec.

First investigation

The potentialities of such a technique for railway operation were first seriously explored by this Region in early 1955. Development of microwave systems in the U.S.A. for public and railway services had accelerated quickly after 1949-50 as a result of the rapid advances in microwave technique acquired by the Services during the last war. In this country the Post Office, in 1952, established the successful microwave television link for the B.B.C. between Manchester and Scotland. In 1956, the transatlantic telephone cable was commissioned. This system makes use of a 575-mile microwave radio link from Nova Scotia to Portland, Maine.

Realising the significance of these

changes in communication techniques, the North Eastern Region's Chief Signal & Telecommunications Engineer ordered a full-scale enquiry into the relevant technical problems and economics. Apart from occasional references in U.S.A. railway journals to systems installed or contemplated on their railways, there was little information available on which to plan a system. Nevertheless, with the willing co-operation of British microwave manufacturers, information was collected to enable a serious study to be undertaken of the route.

Planning problems

York, Darlington, and Newcastle lie on the East Coast main line between London and Scotland. Approximately 44 miles due south of Darlington, York lies roughly in the centre of the great plain of Yorkshire, which is bounded on the east by a line of hills known as the Hambletons, having a fairly level elevation above sea level of just over 1,000 ft. On the west, running due north and south, lies the Pennine chain, consisting of foothills and mountains reaching elevations over 2,500 ft. above sea level. Newcastle lies some 36 miles due north of Darlington and is separated by intervening hills up to 600 ft. above sea level.

The main objective when planning any microwave scheme is to construct the route so that the number of transmitting and receiving points is kept to a minimum. The route could have been covered by erecting an enormous lattice steel tower at each of the three places concerned, to enable the "dishes" to face each other over the horizon. There would undoubtedly have been severe opposition to this proposal from the planning officers and Air Ministry, so the scheme was pro-

jected on the basis of small towers and intermediate repeater stations between terminal stations to amplify and deflect the signals around the curvature of the earth.

On the York-Darlington hop this would have necessitated at least two such repeater stations situated along the railway track side, and possibly three or more between Darlington and Newcastle, because of the complex disposition of the intervening hills. The introduction of so many repeater stations would have weighed heavily against the economics of a microwave system, and it was necessary to restrict the number of repeater stations to, say, one, between each terminal station. At this juncture attention was turned to the possibility of placing a repeater station on the adjacent or intervening hills.

Route planning

Route planning was commenced and a study of the topography of the ground between York and Darlington by contoured maps revealed that a suitable site for a repeater station might be found on the Hambletons, somewhere between the "White Horse" (a famous landmark) near Kilburn, and Scarth Nick, near Os-motherly. A visual reconnaissance was carried out using the deserted ridgeway known as the "Great North Track"—the 4,000-years old drove road which once stretched from Dover to Edinburgh and which ceased to be a trading highway when in 1850 transport of cattle was transferred to the railways.

Reference to the map shows that practically all this territory is contained within the North York Moors National Park. It was realised that the Commission would encounter serious opposition when applying for planning permission, particularly in view of the fact that, discounting economics, a microwave or cable system could have been installed on its own right of way. It was noted that one hill, known as Woolmoor, 850 ft. in height, had escaped the boundaries of the Nature Reserve, and attention was therefore concentrated to this spot.

An "earth chart" was constructed, showing the clearances between a line of sight projected from York to Woolmoor and Darlington. This showed that a "dish" positioned on a 40-ft. tower on the roof of York headquarters could operate satisfactorily into a "dish" situated on a 50-150-ft. tower at Woolmoor, and thence to a "dish" approximately 120 ft. above platform level at Darlington Bank Top Station. Although this solved the technical problem, the question of acquisition of land at Woolmoor remained.

At this juncture, the assistance of the Regional Estate & Rating Surveyor was sought, and a meeting with the landowner was undertaken. It quickly became obvious that the landowner was not particularly interested in the project,

and would have preferred us to have found a different location, so as not, in his own words, "to spoil his landscape." The hill had an access road which was a very important factor and as there were no other likely places outside the National Park, it was decided to go forward with a repeater station at Woolmoor.

Surveying was commenced between Darlington and Newcastle, with a view to establishing one repeater station site. Line-of-sight projections were made on maps and "earth charts," and it was considered that a site might be found on the line of hills near Ferryhill. A visit to the site revealed that history was almost repeating itself—a disused windmill stood on the optimum position, undoubtedly erected on that spot to take advantage of the maximum wind path in all directions. Consideration was given to acquiring and using the windmill in place of erecting a steel tower and brick apparatus room, but the landowner was reluctant to sell as he wished to demolish and build on the site. Furthermore, it was noticed that a degree of land subsidence had occurred in the adjacent field, and enquiries with the National Coal Board revealed that extensive coal workings existed below this section of the land. These could cause instability to the windmill and any other structure erected on this spot. The slightest angular deviation on such a highly critically-focused system would have caused disruption to telephone traffic.

Objection made

It was decided to erect the repeater station approximately 200 yd. south of the windmill where the National Coal Board were maintaining mine roof supports in the vicinity of housing. When the local residents found out that the tower was to be erected at the rear of their homes, they objected on the grounds that the tower might fall down in their direction. The site was therefore extended slightly nearer the windmill.

At Newcastle, it was decided to erect a 191 ft. tower above the platform at Newcastle Central Station immediately over an existing telecommunications apparatus room.

In a 1958-59 Bill, the Commission was granted powers to erect towers of a defined height and to purchase land on which to erect repeaters.

Before the passing of the Bill much work was undertaken by the Commission's Legal Department, which had to relate the various stipulations of the technical officers of this Region with the local planning officers' and landowners' requirements.

Meetings were held with the Commission's parliamentary agents to resolve objections raised by a local district council to the siting of a tower, and negotiations took place with the Postmaster-General, who requested a pro-

tection of his exclusive powers under the Telegraph Act of 1869 and Wireless Telegraphy Act of 1949.

With the eventual passing of the Bill, the way was clear to the seeking of tenders and execution of the necessary work.

Tenders

The contract document and drawings which contributed to the definition of such items as parameters of operation, strength of material, location of stations, maximum heights of towers, specifications of paint and legal conditions, was drawn up and issued on January 26, 1960.

Tenders were received offering equipment manufactured in Great Britain, Holland, and Italy, and a contract was let on April 18, 1961, to Marconi's Wireless Telegraph Co. Ltd., Chelmsford. This company undertook to supply and install the microwave radio portion of the scheme in conjunction with its trading associates, the Automatic Telephone & Electric Co. Ltd., which will provide the carrier multiplex part of the contract. It is interesting to note that the successful company is that founded by Guglielmo Marconi, who carried out a spectacular demonstration of transmission in the microwave band as early as 1896. A condition of the contract was that the successful contractor would carry out over the whole of the route what is known as a propagation survey to establish by practical radio tests the validity of the route chosen.

At the time of writing, the propagation survey is almost completed. Guyed masts of up to 200 ft. in height have been erected at the three terminal and two repeater points. A test is carried out over a section by raising and lowering up

the side of each of the two masts a unit comprising a small "dish" fitted at the rear with a transmitter/receiver. One of the units transmits a steady signal of known strength and the other receives this signal which is recorded on a continuously moving strip of paper by a calibrated automatic field strength indicator.

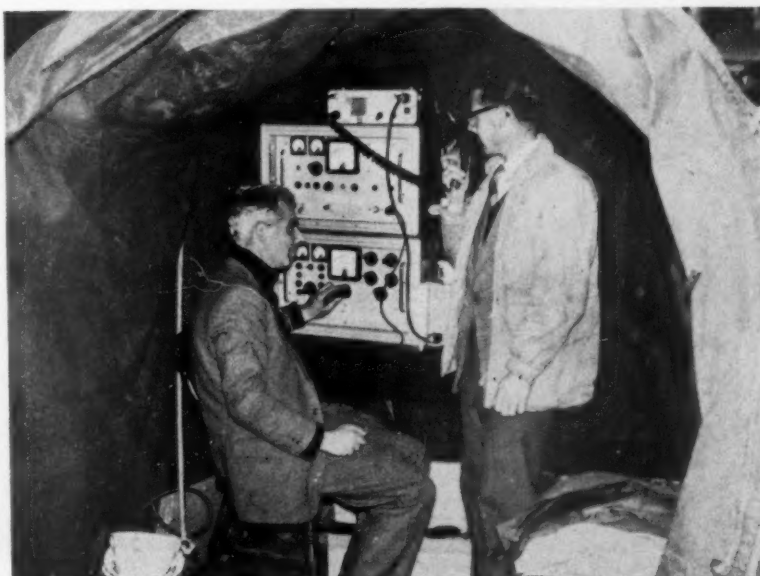
It may be wondered why the strength of the received signal varies. Unlike normal broadcast frequencies, this is not affected by the ionosphere but by the following factors:—

1. Physical obstructions

It has already been pointed out that the straight-line microwave beam will not normally bend round the surface of the earth. The "dishes" must "see" each other. If one is placed at the top of the mast and the other lowered slowly to the foot, any variation in received signal strength as the "dish" nears the ground will indicate that the line of sight is approaching or cutting through an intermediate physical obstruction. The word "approach" is used because the microwave beam must not come within the "first Fresnel Zone clearance" at any point along the path, otherwise a reduction in the received signal will occur. For instance, a clearance of approximately 72 ft. would have to be allowed between an object situated half-way along a 30-mile microwave link and the centre of the path of the signal. Thus, raising and lowering the "dishes" will prove the validity of the route with the height of towers originally chosen.

2. Atmospheric effect

The received signal strength can be affected by the amount of water vapour in the atmosphere. This is known as absorption.



Marconi engineers testing route between Newcastle and Ferryhill

Another factor influencing the received signal is that known as refraction. If part of the atmosphere on the microwave path is of a different temperature to the rest, the radio beam will be deflected or ducted away from the distant receiving "dish" because the air at this point is of a different refractive index to the remainder.

3. Reflection effects

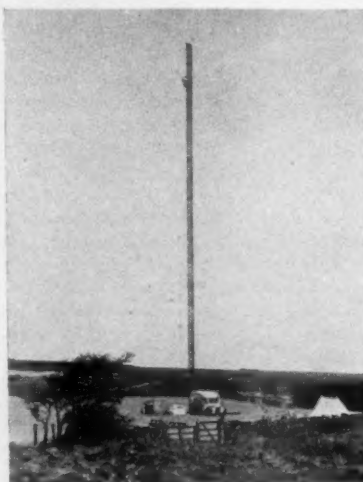
While the transmitter radio beam is relatively very directional, a small proportion of the signal will strike the ground lying between transmitter and receiver. If the terrain is very flat (as would be the case across a plain or stretch of water) reflections would occur, causing spurious signals to be received which could be out of phase with the main signal. This would have the effect of increasing or decreasing the received signal strength.

Film made

Members of the Chief Signal & Telecommunications Engineer's staff, including students, have been actively engaged with the contractor during propagation testing, and the progress of this part of the scheme has been recorded on film by the British Transport Commission's Film Unit.

The contract has been let on the basis that the system will be in full operation by August/September 1962, when initially 180 channels will be available between the three terminal stations, the equipment being capable of expansion up to

300 channels. In the event of a failure between any parts of this microwave link, standby transmitting and receiving equipment would be brought into oper-



Woolmoor repeater station site, 150-ft. propagation testing mast

ation automatically, and users of the circuits would not be aware that there had been a changeover. Standby electricity generating plant will be provided at the two repeater stations to cover the possibility of interruptions to the mains power supply.

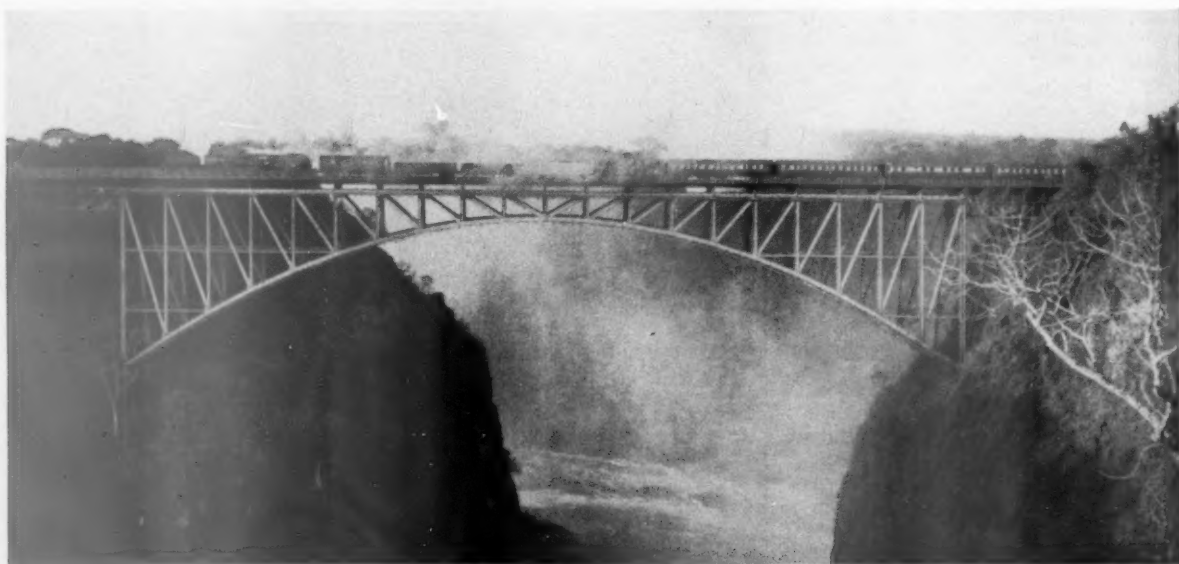
The Regional Architect is at present engaged on the preparation of plans and contract documents for the erection of the repeater station buildings, the aesthetics of which must fit in with the surrounding landscape. A building will be erected at Darlington to house a 1,000-line automatic telephone exchange on the roof of which will be erected an 80-ft. lattice steel microwave tower.

Subscriber dialling system

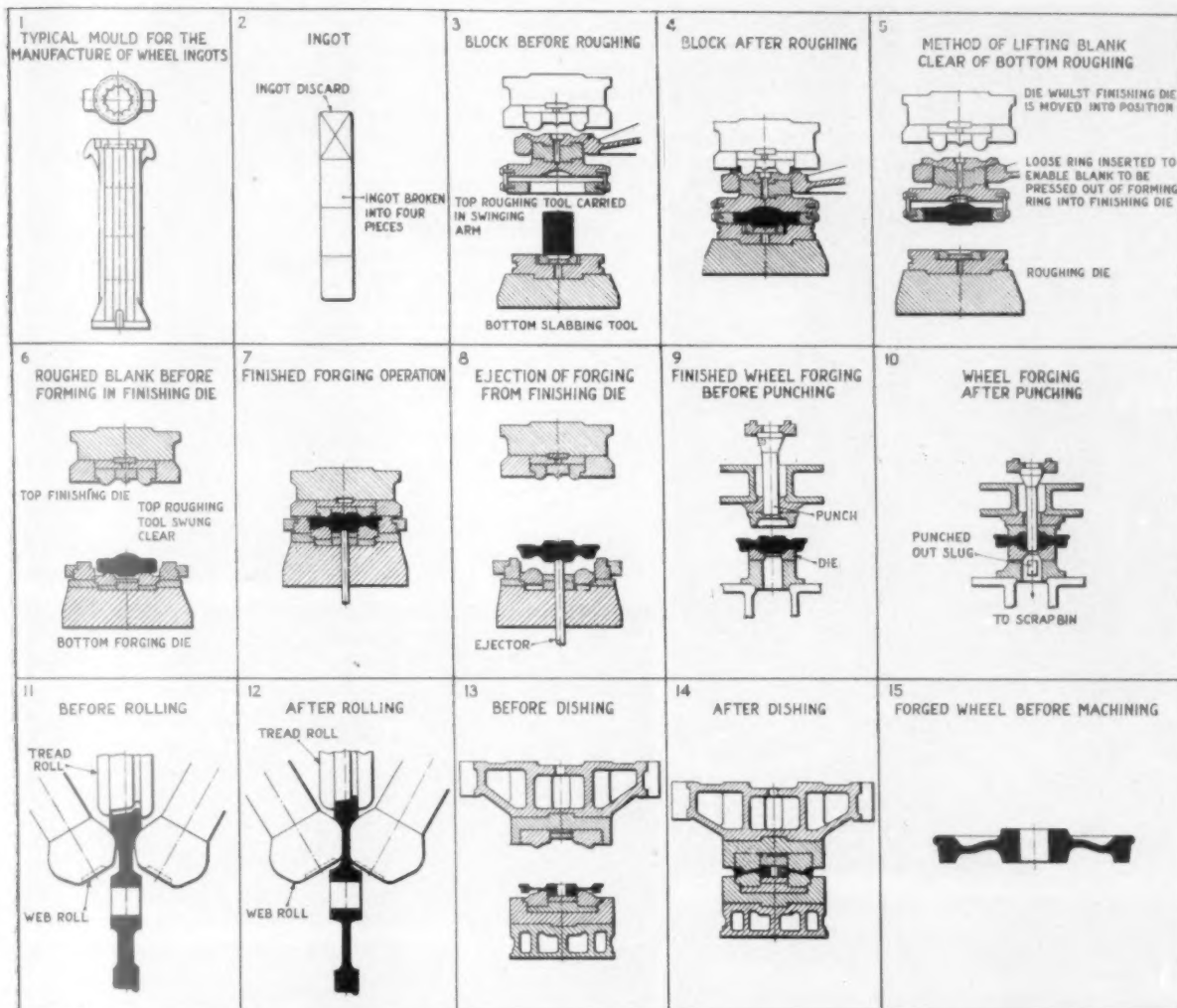
When the system is commissioned next year, apart from providing exclusive circuits for traffic control working, telegraph systems, and so on, a total of 3,000 railway "subscribers" at York, Newcastle, Darlington, Middlesbrough, Leeds, and points as far north as Berwick-on-Tweed, will be brought in contact with each other on a subscriber dialling basis. Plans are being developed to incorporate in this system other points in the Region. In conjunction with adjacent Regions, London and Scotland will follow.

In connection with the new automatic telephone exchange developments, this microwave radio-telephone scheme will constitute the first large-scale subscriber trunk dialling system on British Railways and an accurate study of traffic flow when in operation will prove of tremendous value in the assessment of apparatus quantities for future installations throughout British Railways, enabling the full telephone automation plan to be accomplished in the most economic manner.

VICTORIA FALLS BRIDGE, RHODESIA RAILWAYS



Mixed-goods and passenger train, from the Copperbelt to Bulawayo, crossing the Victoria Falls Bridge over the Zambesi from Northern to Southern Rhodesia



Sequence of wheel-forging operations

WHEEL AND AXLE PRODUCTION at Durgapur Steelworks

THE steelworks at Durgapur, India, is an entirely British effort, shared by a consortium of 13 member-firms known as the Indian Steelworks Construction Co. Ltd. (I.S.C.O.N.), for an annual production of 800,000 tons of finished steel. By the end of 1961 it is expected that the total rail traffic handled by Indian Railways will be 168 million tons a year. Durgapur Steelworks will produce wheels and axles for the rolling stock required to handle this traffic. On commissioning, the initial annual production will be 45,000 wheel sets for both metre and broad gauge, covering five variations in wheel design, and axles suitable for plain-

and roller-bearing axleboxes. Provision has been made to increase this output to a total of 75,000 wheel sets a year.

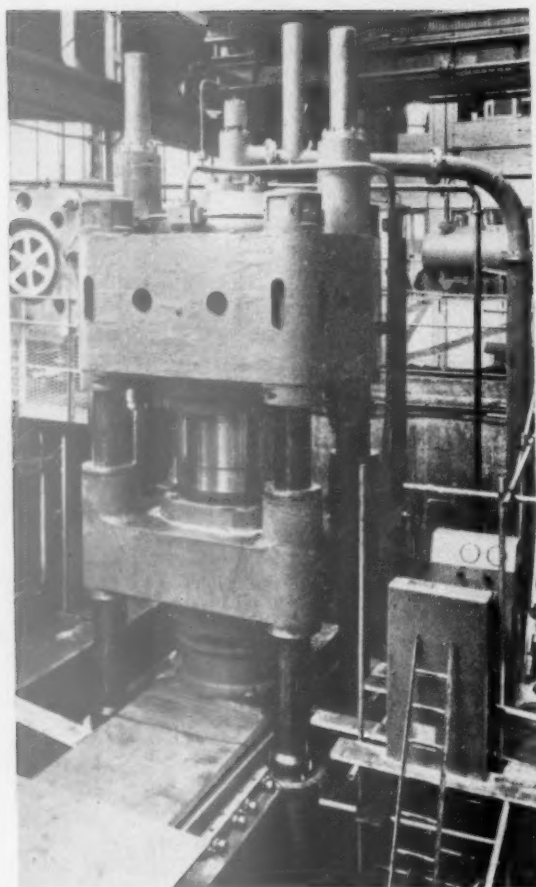
Davy & United Engineering Co. Ltd. is the main contractor for the supply and installation of the rolling mills, sleeper plant, wheel and axle plant, iron and steel foundry, and central engineering maintenance shops.

Craven Brothers (Manchester) Limited is the main sub-contractor for the machine

British-built equipment for an initial annual production of 45,000 wheel sets

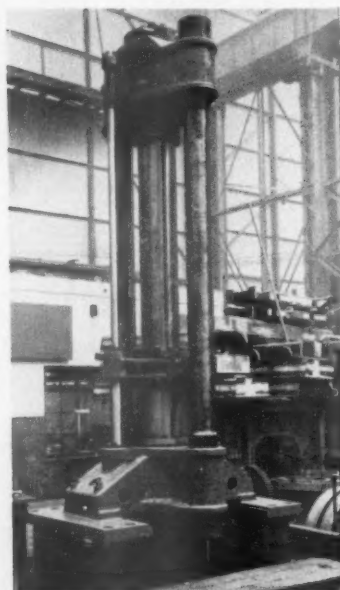
tools and ancillary equipment for the wheel and axle machine shops, roll and die machine shop, tool room, heat treatment department, and test piece machine shop.

Ingots from which the wheel blanks are formed are cast in a vertical mould, arranged for bottom-pouring, in lengths sufficient to make three blanks plus a discard section at the top. Ingots are stored adjacent to the wheel forge and

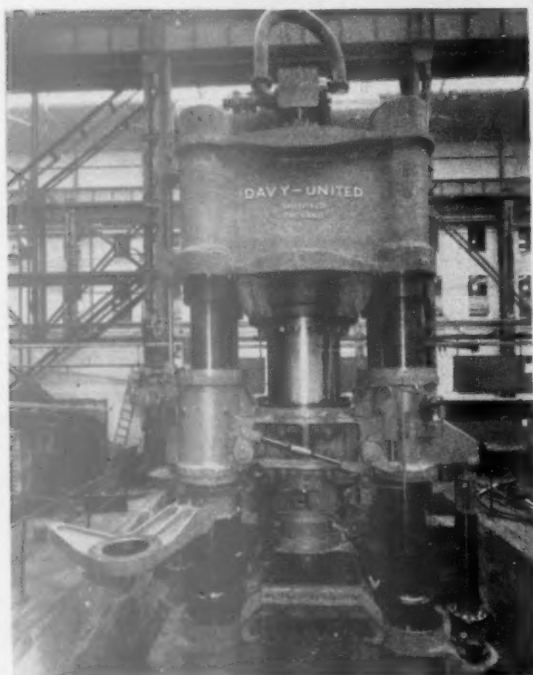
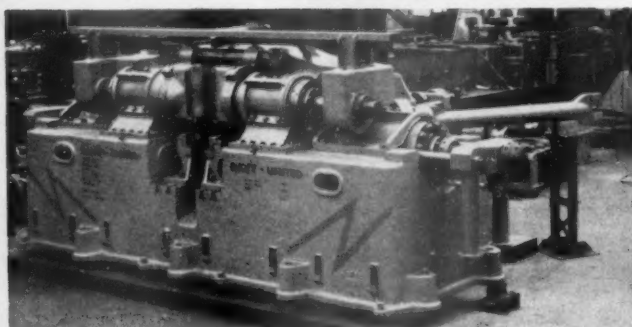


2,000-ton wheel
dishing press

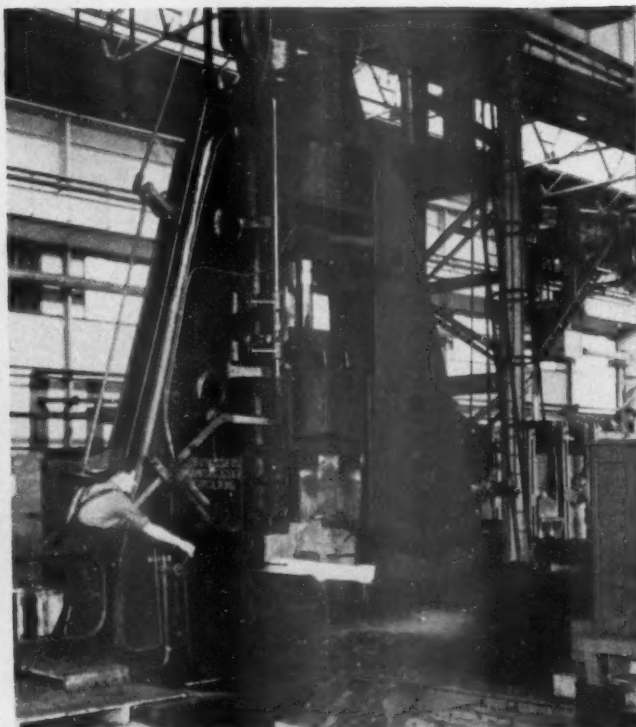
Hydraulic intensifier
for 6,000-ton press



Wheel rolling mill



6,000-ton wheel-forging press



7-ton hammer for axle forging

delivered by gravity conveyor as required by the forge. A section of the conveyor is fitted with a pneumatic brake and on this section the ingots are held stationary while they are nicked by oxy-acetylene torches at intervals corresponding to the individual block lengths required.

The ingot breaker is a double-acting machine driven by a 125-h.p. electric motor. Loading, positioning for breaking, and removal is by hydraulic rams. Each block for use is weighed and marked, and the discards are removed by conveyor to the scrap section.

Rotary-hearth furnace

From the wheel-block storage area the blocks are transferred to the heating furnace. This is a Stein & Atkinson rotary-hearth furnace fired with mixed blast-furnace and coke-oven gas. It is fired in two zones, heating and soaking, with each zone automatically controlled for temperature and fuel-air ratio. An Austeel-Escher recuperator pre-heats the combustion air and automatic furnace-pressure control is provided.

The furnace capacity is 32 blocks an hour having a maximum weight of 12 cwt. The hearth is supported on roller-bearing wheels and the blocks are charged into the furnace in five rows across the width of the hearth. This is then rotated to bring one row of blocks into the discharging position and to leave space for a further row to be charged.

The charging and discharging doors, which are 330 deg. apart, are hydraulically operated, the discharge door being controlled from a floor strip by the discharging machine. A circular tell-tale board which rotates in step with the hearth enables the operators to record the position of all blocks charged into the furnace.

Wheel-blank forging

When heated to forging temperature, the blocks are removed from the furnace by a mobile floor-type handling machine, descaled on the top and bottom faces in a flail machine, and then taken to the loading side of the wheel-forging press.

Wheel forging is carried out on a Davy-United 6,000-ton hydraulic press. This has a capacity of 50 wheel blanks an hour, producing blanks up to 45 in. in dia. The initial forming of the blank requires a force of 3,000 tons, which is obtained by feeding the hydraulic supply from the pump-accumulator system direct to the main cylinder. Finish forging requires the full force of 6,000 tons and, to obtain this, the pump pressure is fed into an intensifier.

The roughing tool on the press is carried on a pivoted arm which allows this tool to be swung clear for the finished forging operation. Ejection of the wheel blank from the die is by means of a hydraulic ram in the base of the press. The sliding table, gripping

fingers, swinging die-holder, and other ancillary motions are hydraulically operated, and are controlled from a desk.

A Fielding press of 1,000 tons capacity is used for punching the centre-hole in the wheel blank. Power consumption on this press is reduced by two-speed operation of the ram, the punch approaching the wheel blank at 7½ in. per sec. and punching at 3 in. per sec. A power-operated sliding table is used for loading and removal of the blanks after punching.

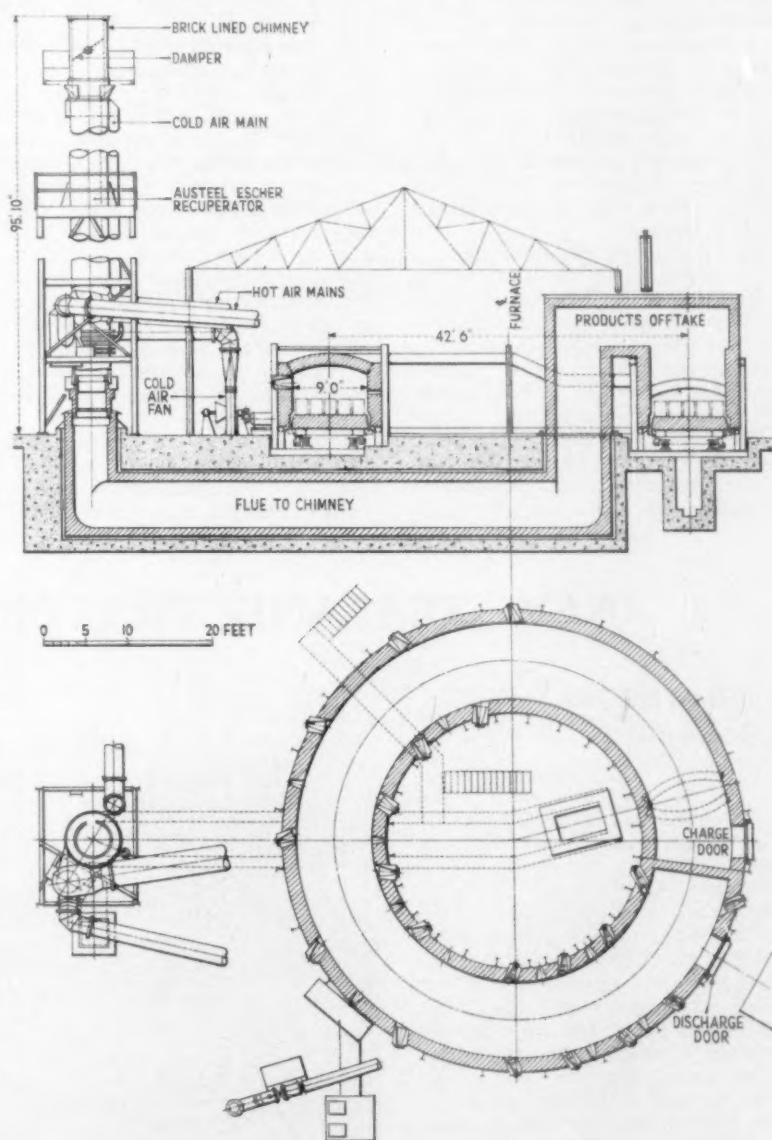
Following the punching operation the blanks are passed to the Davy United rolling mill for the rolling of the web and rim. All rolls are independently driven and pressure applied to each by hydraulic cylinders. The web rollers are inclined and driven by 500-h.p. d.c.

motors, having a variable speed range of 0-130 r.p.m. The advance rate of the rolls is controlled by metering valves and the travel is indicated electrically by dial indicators on the control desk. A self-contained pumping unit is incorporated for operation of the hydraulic rams.

Dishing operation

After rolling to required thickness, the web is dished on a 2,000-ton Fielding press. This has a single-acting down-stroke ram for the dishing operation and twin rams for the return stroke. A power-operated sliding anvil is used for loading and unloading.

Hydraulic power for the wheel-forging presses is supplied by a Fielding pump unit and air-loaded accumulator. Two horizontal three-throw pumps are used,



Rotary-hearth furnace for wheel block heating

each driven through gearing by a 600-h.p. synchronous induction motor.

Wheel normalising is carried out in two rotary-hearth furnaces, each having a capacity of nine wheels an hour. The blanks are loaded in stacks of three and 17 stacks can be accommodated. Furnace temperature and fuel-air ratio are automatically controlled.

In addition to the normalising furnaces a section is provided for undertaking a full range of heat-treatment. This is equipped with three fixed-hearth furnaces, an oil-quenching tank fitted with mechanical-handling equipment, and a water-spray quenching machine.

Mechanical handling equipment

In the layout of the plant and in the planning of the sequence of operations, considerable attention has been given to reducing the time and amount of component handling. Machines and furnaces are grouped together in the correct processing sequence, and extensive use is made of gravity-type roller conveyors. For the lifting, handling, and manipulating of wheel blanks during forging, several types of mobile-handling machines have been designed and built by the Wellman Smith Owen Engineering Corporation Limited.

The machine for furnace charging is only required to operate over a limited range in a straight line, and has been arranged to run on rails set flush with the floor. This machine is powered by a rear-mounted electric motor, supplied by trailing cables from a power point. The operator travels on the machine and controls the travelling, rocking-hoist, bar-turning, and gripping motions. Outside the furnace doors is a fixed-indicator rail used by the truck operator to obtain

the correct loading positions in the furnace.

The other machines are powered by diesel engines, mounted on rubber-tyre wheels and are fully mobile. The engine drives a hydraulic pump and for travelling the rear wheels are independently driven through worm gearing by twin hydraulic motors. Steering is hydraulically operated by rack and pinion, and lifting of the hoist boom is by a hydraulic cylinder. Rotation of the head carrying the grip levers is performed by a hydraulic motor, the speed of rotation being controllable between 10 and 20 r.p.m. Several of the machines are fitted with swivelling heads but without power operation.

Axle forging production

Axle-bloom stock is received into the stock bay in 20-ft. lengths, and cut into suitable lengths for axle forging on a cold saw. Two cold saws are installed, each powered by a 10 h.p. electric motor, and suitable for sawing blooms up to 8½ in. square. From the storage bay the cut lengths are delivered to the axle-heating furnace, which is conveniently located between the storage bay and the forge. The Stein & Atkinson furnace is of the two-zone-fired pusher type, designed for heating 12 axle blooms an hour from cold to forging temperature. Combustion air is pre-heated in an Austeel-Escher recuperator and automatic control is provided for furnace temperature, fuel-air ratio, and pressure. The pusher for moving the blooms through the furnace, and the furnace doors, are hydraulically operated.

When a heated bloom is discharged it slides down skids to a roller conveyor, from which it is transferred to another conveyor, which is controlled by the air-

hammer driver, to feed the manipulator.

The axles are forged to shape from the blooms by a Massey 7-ton compressed-air hammer having a maximum stroke of 46 in. The control-valve gear of this hammer has been designed for maximum economy of air consumption and to permit the required weight of blow to be delivered at any length of stroke. The anvil is a solid-steel casting weighing 105 tons. Handling of the axles under the hammer is performed by an Adamson Alliance 6,000-lb. bridge-type electro-hydraulic forging manipulator. After forging the axles are transferred by roller conveyor to a cooling bank.

Heat treatment

Heat treatment is carried out in a Stein & Atkinson wide-walking beam-type furnace, with provision for controlled heating and soaking of 12 axles an hour, working on a four-hr. cycle. The oil-operated walking-beam mechanism is arranged to charge and move the axles through the furnace in a series of steps, and during this operation each axle is slowly rotated to obtain even-heat penetration. On discharge from the furnace the axles roll to an oil-quenching tank for hardening or tempering as required.

Before machining all axles are then straightened and descaled. The straightening press is a 150-ton single-ram hydraulic machine. This has a stroke of 12 in. and the working pressure of 1½ ton per sq. in. is provided by a Towler self-contained pumping unit.

The half-tone illustrations to this article show the machines under construction at the makers' works. The Massey air-hammer photograph was taken at the works of Steel Peech & Tozer Limited.

NEW ZEALAND TRAVEL CENTRE

Combined rail and road terminal

A NEW rail and road travel centre, the first of its kind in New Zealand, has been opened at Rotorua, centre of New Zealand's main thermal region.

Measuring 284 ft. in length x 28 ft. in width, the new building is compactly located between the railway and the road service platforms. Its open-counter type booking office, parcels and luggage facilities, waiting rooms and self-contained refreshment service, serve both railcar and road service passengers.

The opening of the £85,000 travel centre marked the second-to-last stage in a £200,000 modernisation scheme initiated at Rotorua in 1956.



Exterior of the rail and road terminal at Rotorua

LIFTING BARRIERS AT BARTON STREET, in the Western Region

LIFTING barriers for level crossings are now being introduced in a number of places. One of the most interesting of the recent installations is at Barton Street, Gloucester. The crossing is situated on the Western Region main line from Bristol to Birmingham and is at the Bristol end of Gloucester Eastgate Station. The railway crosses one leg of a road junction in the middle of the city. The roads involved are Barton Street, Lower Barton Street, Park Road and Station Road. The railway crosses Lower Barton Street as can be seen from the illustration; the roads parallel to the railway are Park Road (in the foreground on the right) and Station Road. Barton Street is the main thoroughfare for the most densely populated area of the city, with its own shopping centre. A recent check on road traffic over the crossing gave an average user of 750 vehicles per hour during the day, rising to 900 per hour in peak periods. On a normal weekday, 140 trains are dealt with at Barton Street Junction signalbox, but on Saturdays, in summer, there is extra traffic to and from the West of England. During peak hours an average of nine trains are dealt with hourly.

Previous arrangement

Until the new power-operated barriers were installed, the gates had to be opened and closed by hand, the gates being locked across the road by road stops operated from a ground frame. This was a slow business, with the result that unless there was a fair margin between successive trains, the gates had to remain shut, often for a considerable period.

In contrast, the new barriers can be lowered in 18 seconds and raised in nine seconds. Thus road traffic can be allowed over the crossing with much narrower margins between trains.

Traffic lights displaying the standard red, amber, and green aspects are provided for the road junction but the Lower Barton Street lights are sited on the far side of the railway crossing, to give protection. The interesting point is that the Barton Street signalman, who operates the barriers, exercises an over-riding control over all the traffic lights. As the signalbox is adjacent to the crossing and built over the railway, the signalman has a full view of the road traffic.

The crossing is equipped with double half-barriers, the road being too wide and the road traffic too heavy for single

barriers to extend the full width.

The crossing equipment is operated from a pedestal control in the signalbox as illustrated. To lower the barriers, the rotary switch at the back of the panel is turned to "lower." This initiates the restoration of all the road signals to the red aspect, subject to the proviso that if a signal has just changed to green, there is a minimum aspect period before the signals are restored to red.

Sequence of lowering

When the road signal indicator, on the left of the panel, shows "red," the barriers may be lowered. The signalman now presses the operating button on the right of the panel and holds it down until the barrier position indicator (on right of panel) shows "down." The nearside half-barriers are lowered first and when they have reached the horizontal position, the off-side barriers are lowered. This sequence assists the working of the crossing.

The motion of the barriers can be instantly stopped by releasing the "Operate" button and the direction of motion can be reversed, if necessary, by resetting the raise/lower switch. Once the barriers are down, they are detected, and locked in the horizontal position and immediately the red aspects of the Station Road and Park Road traffic lights are suppressed and green filter lights are

Road traffic lights under the control of the signalman

illuminated. This frees the road traffic for movements parallel to the railway and from Park Road for a left turn into Barton Street.

In the signalbox, the signalman is now able to restore the interlocking lever to normal in the locking frame and thereby free his railway signal levers for train movements.

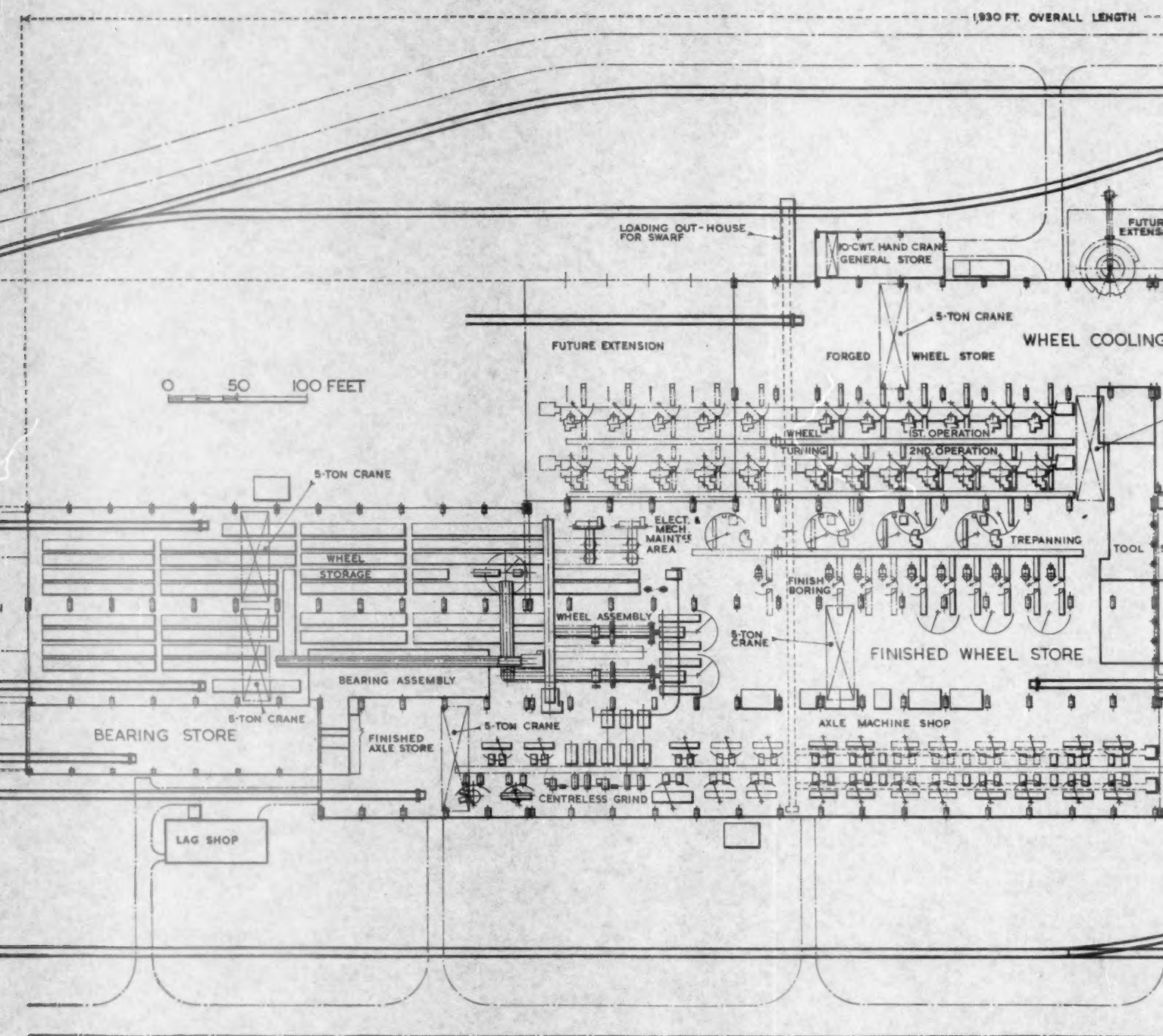
After the passage of a train, the railway-signal levers are restored and the barrier-interlocking lever is reversed. On the control pedestal the rotary switch is turned to "raise." This action causes the road-filter lights to be extinguished on the Station Road and Park Road signals and these change, through amber, to red.

Raising the barriers

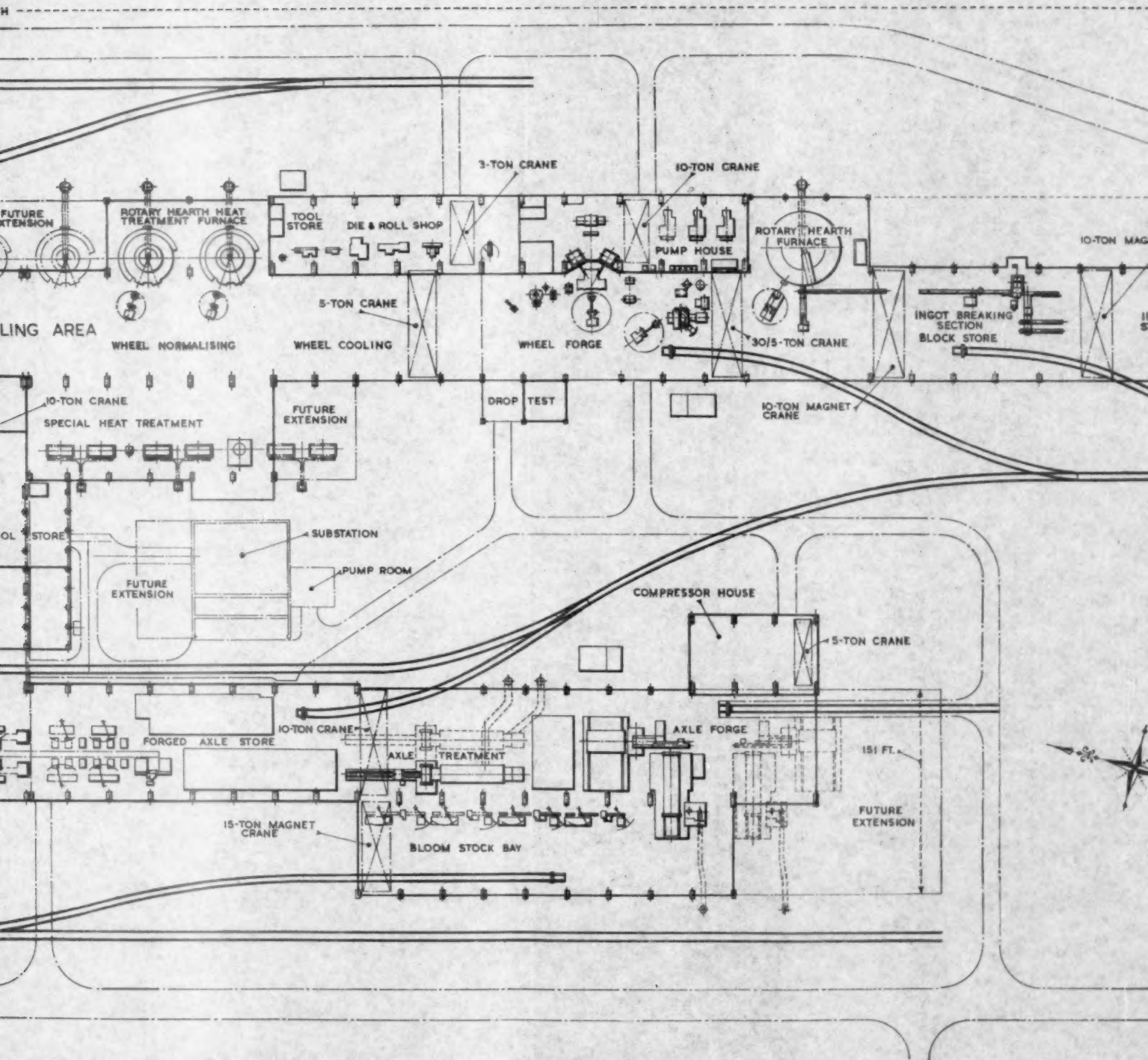
The barriers can now be raised. The signalman depresses the "Operate" button and all four barriers rise simultaneously. A barrier raising or lowering movement takes nine seconds, so that the crossing is therefore opened to road traffic in nine seconds whereas it takes 18 seconds to close the crossing, due to the sequencing of barriers. When all the barriers are fully raised, the barrier position indicator shows "up" and automatically the Barton Street/Lower Barton Street road signals change through amber to green. This phase of the road signals is given a priority clearance after



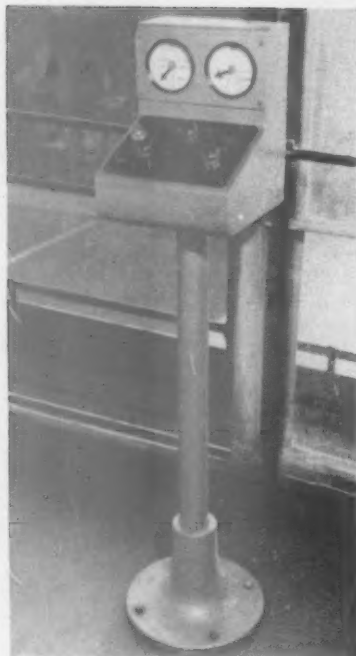
Lifting barriers at the Barton Street crossing



LAYOUT OF DURGAPUR V



WHEEL AND AXLE PLANT



Control pedestal for lifting barriers at Barton Street crossing

the crossing has been closed but, subsequently, normal cycling of the road signals is resumed.

Length of barriers

Each half-barrier is 29 ft. long, painted in alternate red and white bands, 2 ft. wide. From it hangs a light-alloy folding skirt, similarly painted. Retro-reflecting red strip, 1 in. wide, is provided along the red painted parts of the boom, on the front and rear faces of the nearside barriers but, on the offside barriers, only on the edge facing on-coming traffic. An 18-in. diameter red retro-reflecting target is also fitted on the facing edge of each nearside barrier. Two red boom lamps are fitted on each barrier and are illuminated at all times except when all the half-barriers are in the raised position.

The half-barriers are operated electrically, using a hydraulic drive. Each barrier is equipped with a self-contained drive unit consisting of a two-way acting ram, electric-motor pump, oil tank, two solenoid valves, a non-return valve, a relief valve and two manual-release valves. The pressure normally required is 150–200 lb. sq. in., but can rise to 1,800 lb. sq. in. if there is resistance to the barrier's movement. The relief valves protect at

1,800 lb. sq. in. Each ram is capable of exerting a maximum thrust of 2,000 lb. One solenoid valve is opened at a time—one for raising and the other for lowering the boom. When the barriers are at rest, both valves are closed and the system is hydraulically locked. In the event of failure, a barrier may be freed for manual operation by unscrewing two release valves on the drive unit. There is also a key on the control pedestal, which if extracted and transferred to a key switch in the equipment cupboard on the ground at the side of the crossing, permits the installation to be operated, in emergency or for maintenance purposes, from a lineside controller.

Drive units

The drive units, barrier lamps and control circuits are operated at 24V. d.c. Each half-barrier has a six-way rotary contact box, for motor cut-off in the up and down positions, for detection and for sequencing.

These power-operated barriers were engineered and designed by British Railways, Western Region, to comply with the Ministry of Transport requirements. They were manufactured by the Region's Reading Signal Works.

MOUNTAIN LINE FOR MEXICO Chihuahua-Pacifico Railway

LATER this month President López Mateos of Mexico will formally open the Chihuahua-Pacifico trans-Mexican railway as a through route from the United States Texan border to Topolobampo, a rising Pacific port. Actually the two end sections were completed in 1910, and it was only in 1954 that the Texan Government faced the task of constructing a line across the intervening gap between them—from Creel near Sanchez to Hornillos—over the Sierras, a precipitous and previously-impenetrable range. The difficulties encountered by the construction engineers were described and illustrated in an article entitled "Modern Railway Construction in Mexico" in our issue of October 2, 1959. It is the completion of this central link that has now enabled the railway to be completed throughout. Despite the difficulties of the route, the engineers have succeeded in providing a ruling gradient of 1 in 40 and 11-ch. curves, but only at the cost of constructing about 70 tunnels with an aggregate length of some seven miles, and 25 bridges in all about a mile in length. Rock cuttings up to 125 ft. in

Completion of through route to give cotton growers access to the Pacific Ocean ports

sidelong height and some 90 per cent of the total excavation in rock were also necessary.

The completion of the line will

provide access to the Pacific for cotton growers in the hinterland, and open up a hitherto under-developed region of Mexico.



Map showing connecting link in new railway

PERSONAL

British Transport Commission

SIR JOHN BENSTEAD, C.B.E. M.INST.T., Deputy Chairman of the British Transport Commission who, as recorded in our July 28 issue, is to retire on September 30, was educated at King's School, Peterborough, and joined the Great Northern Railway in 1911. From 1915 to 1919, he served with the Royal Navy. He was Secretary of the Peterborough No. 1 Branch of the National Union of Railwaymen from 1922 to 1935. A member of Peterborough City Council from 1929 to 1935, he was Deputy Mayor of that city in 1932. From 1943 to 1947, he was a member of the General Council of the Trades Union



Sir John Benstead

Congress, and from 1943 to 1948, a member of the Advisory Council, Scientific & Industrial Research. In 1947, Sir John Benstead was appointed a member of the Royal Commission on the Press, and he served as a member of the Colonial Economic & Development Council from 1946 to 1947. During those years he was also President of the International Transport Workers' Federation. He is Chairman of the Nationalised Industries' side of the Minister of Labour's National Joint Advisory Council, and a member of the British Productivity Council. He has been a full-time Member of the British Transport Commission since 1947, and Deputy Chairman since 1949. He was awarded the C.B.E. in 1946 and a Knighthood in 1953.

British Railways

MR. F. C. MARGETTS, Assistant General Manager (Traffic), British Railways, North Eastern Region, has been appointed General Manager with effect from September 1, in succession to MR. H. A. SHORT who is to retire on August 31.



Mr. A. G. Fox

MR. A. G. FOX, District Estate Surveyor Liverpool, British Railways, London Midland Region, who, as recorded in our July 28 issue has been appointed Assistant to the Estate & Rating Surveyor, Euston, was educated at Lawrence Sheriff School, Rugby, and entered the service of the former London Midland & Scottish Railway as a draughtsman in the district estate office at Preston in 1932. Mr. Fox volunteered as a Sapper Surveyor in the Royal Engineers in 1939 and served in France with 165 Railway Survey Company. He was commissioned in 1940 and served in Iraq and India with railway construction and survey units and was twice mentioned in despatches. On his return to railway service he became a surveyor in the Preston Estate Office and, in 1949, was transferred to Euston as Assistant Valuer in the Estate & Rating Surveyor's Department. He was appointed Assistant Surveyor, Estate & Rating Surveyor's Department, Marylebone, Eastern Region, in 1950 and, a year later, returned to the London Midland Region as Chief Surveyor in the Estate & Rating Surveyor's Department. Subsequently he became Assistant District Estate Surveyor, St. Pancras, and returned to the Estate & Rating Surveyor's Department as a Surveyor at Marylebone, Eastern Region, in May, 1954. He was appointed District Estate Surveyor, Liverpool, in 1955.

MR. P. J. FISHER, Line Traffic Officer, (Operating), Crewe, British Railways, London Midland Region, has been appointed Co-ordinating Officer (Euston Station Reconstruction).

MR. A. M. Y. ROBB, District Operating Superintendent, Manchester (South), British Railways, London Midland Region, has been appointed Co-ordinating Officer (Birmingham Station Reconstruction).

MR. J. A. K. GRAY District Traffic Superintendent, Carlisle, British Railways, London Midland Region, who, as recorded in our July 28 issue, has been appointed District Operating Superintendent, Nottingham, entered railway service as a Traffic Apprentice at Bicester in September, 1935, and, after training at a number of stations and in various departments, was appointed a relief Stationmaster at Northampton in September, 1939. During the last war he served most of his time in the Royal Engineers (Movement Control) in North Africa and Italy, attaining the rank of Captain. After demobilisation in 1946 Mr. Gray was appointed Goods Agent, Darwen. He became Assistant



Mr. J. A. K. Gray

District Traffic Superintendent, Ayr, later in that year. He was appointed Assistant District Operating Superintendent, Derby, in November, 1950, Assistant District Operating Superintendent, Nottingham Midland, and District Traffic Superintendent, Carlisle, in 1956.

MR. J. E. BELL, M.I.MECH.E., A.M.I.LOCO.E., Locomotive Works Manager, Ashford, British Railways, Southern Region, who has been appointed Locomotive Works Manager, Eastleigh, was educated at Radley College, and joined the Southern Railway as a pupil of the late MR. R. E. L. MAUNSELL at Ashford Works in 1925. In 1929 he became Assistant Locomotive Testing Engineer and in 1933, Assistant Locomotive Maintenance Engineer. In 1934 he was appointed Assistant for the Isle of Wight in charge of C.M.E. Locomotive Running and Traffic Departments staff. He served in France with 153rd and 154th Railway Operating Companies, the two Supplementary Reserve companies of the L.N.E.R. and G.W.R. respectively. In 1943 he was appointed Assistant Director of



Mr. J. E. Bell

Transportation (Railway Operating) at A.F.H.Q., and in 1944 he was transferred to G.H.Q., India, and later commanded No. 8 Indian Railway Operating Group, which was then employed assisting on the broad-gauge main line of the Bengal Assam Railway between Calcutta and Siliguri. He was Mentioned in Dispatches for work in North Africa. He was appointed Assistant Works Manager, Brighton, Southern Railway, in 1945, Works Manager, Ashford, in 1946, and Locomotive Works Manager, Ashford, in 1951.

Overseas

MR. W. G. WRIGHT, General Mail & Baggage Agent, Montreal, Canadian Pacific Railway, who, as recorded in our July 21 issue, has been appointed Manager, Mail & Baggage Traffic, joined the C.P.R. in 1925 as a labourer and later became an engine cleaner. In 1926 he was appointed Clerk at Farnham and later that year he moved to the General



Mr. W. G. Wright

Superintendent's Office, Montreal. He was subsequently employed in the Freight Traffic and the Passenger Traffic Departments. Mr. Wright was appointed Assistant Chief Clerk, Passenger Traffic Department in 1939, Chief Clerk, Mail & Baggage Department, Vancouver in 1946, and General Mail & Baggage Agent, Montreal in 1951.

MR. E. M. MACCORMICK, Agency & Charter Supervisor, Canadian Pacific Airlines, has been appointed London Passenger Sales Manager for the company's ocean, rail, and air services, London.

Institute of Transport

The Institute of Transport has awarded a Henry Spurrier Memorial Scholarship to MR. A. STONE, Deputy Chief Traffic Officer of Leeds City Transport, and Hon. Secretary of the Yorkshire Section of the Institute, to enable him to study road passenger transport in the U.S.A.

Industrial

MR. A. G. DENNIS has ceased to be a Director of B.E.T. Omnibus Services Limited.

MR. J. W. MYHILL has been appointed Manager, Perivale Sales Office, Goodyear Pumps Limited.

SIR MILES THOMAS, Chairman, Monsanto Chemicals Limited, has joined the board of the Dowty Group Limited.

AIR CHIEF MARSHAL SIR FRANCIS FOGARTY has been appointed to the board of Racal Instruments Limited.

MR. J. LARGE has been appointed General Manager, Winding Wires Division of British Insulated Callender's Cables Limited.

MR. D. H. MAXWELL has been appointed Sales Manager, Transmission Division, Telephone Manufacturing Co. Ltd.

MR. J. BENNETT and MR. W. GRAY have been co-opted to the board of Nalder Brothers & Thompson Limited, the company recently acquired by A. Reyrolle & Co. Ltd.

MR. H. E. HILL, Chairman, Laycock Engineering Limited has resigned as Chairman, but remains on the board. MR. S. WALKER has been appointed Chairman.

MR. H. B. MORRIS has been appointed a Director of Wickman Limited. MR. H. ANDREWS has been appointed Secretary, and MR. H. L. HUDSON, Chief Accountant.

DR. B. L. GOODLET, Managing Director of Brush Electrical Engineering Co. Ltd. is to retire as Managing Director, but will continue as Vice-Chairman. He is succeeded by MR. J. E. SMITH, Managing Director, National Gas & Oil Engine Co. Ltd.

MR. H. WEST, Managing Director, Associated Electrical Industries Limited, has been installed as President of the Institute of Welding for the ensuing year. MR. C. HUMPHREY DAVY, Director, Babcock & Wilcox Limited, and MR. L. REDSHAW, Deputy

Managing Director, Vickers-Armstrong (Shipbuilders) Limited, have been elected Vice-Presidents.

MR. J. W. SELLERS has been appointed Product Manager, Motor Graders, of the Le Tourneau-Westinghouse Company of Illinois.

MR. J. V. SANTRY has resigned his directorship of the Superheater Co. Ltd., and MR. J. MAYER of International Combustion (Holdings) Limited, has been appointed a Director.

MR. C. O. BOYCE, Managing Director, Automatic Telephone & Electric Co. Ltd., has relinquished that position and has been appointed an Executive Director of British Insulated Callender's Cables Limited.

Ministry of Transport

The Minister of Transport has appointed MR. L. J. CULSHAW and MR. J. F. T. NAGLE to be Auditors of the Accounts of the British Transport Commission for the year ending December 31, 1961.

Mr. C. Grasemann— an appreciation

Sir John Elliot writes:—

Cuthbert Grasemann was one of the most colourful and individual figures of the old railway publicity world. It was on my recommendation to Sir Herbert Walker in 1930 that he was appointed to succeed me in charge of the publicity, public relations, and commercial advertising activities of the Southern Railway, including the Continent and the United States.

When I first met Grasemann in 1925 he was languishing in the Operating Department at Exeter. His quick mind was ill at ease in the quiet south-west, and his heart was never really in operating. He asked me several times if I could find him a place in the advertising department, so when the chance came I suggested his name, and thereafter, for the best part of 20 years, he presided over S.R. salesmanship with vigour and distinction.

His energy matched his intelligence—an ideal combination for this creative work, and all he did bore the hallmark of quality. He was controversial, even cynical, by nature, and at times he raised storms with his colleagues, which always died away in the swift reconciliation dictated by his warm heart and love for his friends, who were many.

He was the reverse of a "yes-man," but no one could take adverse decisions with more self-discipline than he, though, in his own mind he never compromised with his principles and remained defiantly in possession of his soul to the day he retired, out of tune with nationalisation and the inevitable disappearance of the old S.R. ideals.

He did fine work afterwards on the Court of the Stationers & Newspaper Makers Company, and his year as Master was a memorable one at Stationers' Hall.

C.G. was a man of spirit, a loyal friend and a formidable opponent. He left his mark on our industry and he will be remembered with affection and respect.

NEW EQUIPMENT *and* Processes



PLAITED ROPE

Although not new, in that it has been made for special purposes over many years, only recently has eight-strand plaited rope, of an easily-spliced type, become generally available.

Known as Squareline, this rope provides a larger wearing surface than is usual, and consequently greater resistance to external abrasion and internal friction. Under similar conditions it is stated to continue working for nearly twice as long as a comparable three-strand rope.

Laboratory tests have shown that elongation under working load is about 20 per cent less than that of a three-strand rope. The breaking strain equals B.S.S. No. 2032 for the equivalent size of a three-strand rope.

Squareline resists kinking and, as it is especially pliable, grips a winch drum or capstan particularly well.

Further details may be obtained from British Ropes Limited, Carr Hill, Doncaster.

METAL SPRAYING

When spraying metal at high rates it is important that the metal be applied with the utmost economy. With this end in view Metallisation Limited has produced an auxiliary spreader nozzle for attachment to their Mark 33 metal-spraying pistol. This attachment is reported to spread the spray stream from a $\frac{3}{16}$ in. dia.

wire to an effective width of 3 in. at normal spraying distance.

By means of a tap the spreader may be switched on and off independently of the pistol.

Further details may be obtained from the manufacturer, Pear Tree Lane, Dudley, Worcestershire.

PLUG GAUGES

A new type of air plug gauge, known as the Hardcoat, has been introduced.

These gauges are made of aluminium processed to give a hard surface. Laboratory tests, and field trials under severe conditions, are reported to have shown that Hardcoat plugs will last approximately five times longer than chromium-plated gauges.

Through and blind-hole forms are available for all sizes larger than 0.400 in., and for holes of any depth.

Further particulars can be obtained from Teddington Industrial Equipment Limited, Sunbury-on-Thames, Middlesex.

VERTICAL CAR PARK

Vertical car parking might be of interest to railway managements who desire to provide parking facilities but are short of space.

The Wulpa Liftpark is a bolted structure of universal columns with allowances for cladding according to individual requirements. The structure covers a

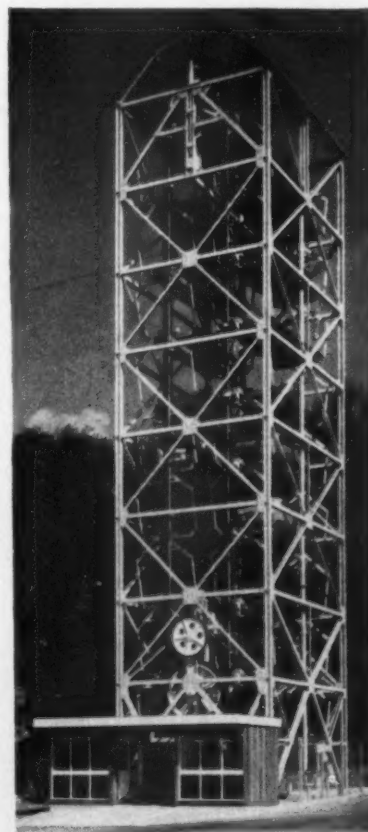
ground area of 24 ft. x 20 ft. approximately, and the height to eaves is 75 ft.

Within the structure are housed 20 cabins, each capable of carrying a car of 19 ft. maximum length and 2 tons maximum weight. The cabins are coupled to a pair of 16-in. pitch chains, each of which has an ultimate breaking strength of 135 tons. These chains run on fabricated steel chainwheels, the bottom pair of which is driven by a 45 h.p. electric motor through a reduction gearbox and gear train.

The cabins are guided in their vertical path by rollers which run in channel guides. A patented device steadies the cabins on their path round the upper and lower chainwheels and ensures that the load on each cabin is maintained through the vertical axis.

Operation may be by push button for manual control, or by key for automatic control. Cabins are returned to ground level in an average time of 30 seconds.

Further particulars may be obtained from the Butterley Co. Ltd., Ripley, Derby.



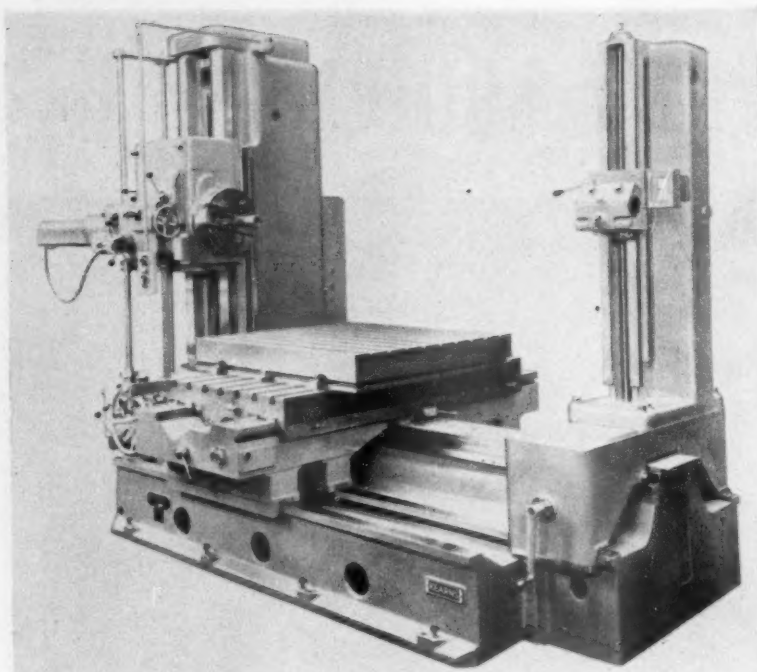
BORING MACHINE

A feature of the Optimetric horizontal 721P tool-room surfacing, boring, milling, drilling, and tapping machine, is the combination of the travelling spindle with a built-in automatic facing chuck.

The facing chuck is carried on a forged-steel sleeve running in two long parallel bearings, one of which is placed well forward to reduce overhang of the cutting tool to a minimum. Housed within the sleeve is a nitrided bush which rotates on ball and roller bearings. The spindle can be revolved independently or in conjunction with the facing chuck.

Main drive is by a $7\frac{1}{2}$ -h.p. motor mounted at the back of the bed. The Optimetric system enables settings to be made to 0.001 in. to a limit of error of plus or minus 0.00025 in. The spindle dia. is 3 in., the facing chuck will face 24 in. dia., and the maximum distance from the facing slide to the boring is 4 ft. square.

Further details may be obtained from H. W. Kearns & Co. Ltd., Broadheath, Nr. Manchester.



ARC WELDER

A new version of the Fararc toroidal arc welder incorporates long-established electrical features with up-to-date materials.

The fan-cooled transformer has a core made from grain-orientated silicon steel, with windings of double-glass-covered copper; the insulation uses asbestos and glass cloth.

The welder has a current range from 60-300 amps, with a continuous rating of 200 amps. Power factor varies between .8 and .9, and the magnetising current is 80 milliamperes. The unit weighs 90 lb., and is contained in an all-steel case measuring 14 in. cube. Louvers at the back and front allow free passage of forced air over the windings. A Tufnol ring is rotated to expose different secondary windings, giving 17 different windings. There are two carrying handles at the sides, and the unit is mounted on four rubber feet. A primary entry at the back measuring 6 in. x 4 in. allows



easy change of copper bus-bars to give 200/250V. or 400/440V. running.

Further details may be obtained from Portable Welders Limited, Castle Mills, Buckingham.

PAINT

A new paint has been developed for use on surfaces previously coated with cement paint.

Intended solely for outside use, it may be applied on new or old cement rendering, concrete, brickwork, roughcast, stonework, and asbestos-cement sheets which have been previously treated with a cement paint.

The paint, which has a covering capacity of 30 sq. yds. a gallon in one coat, is said to have outstanding resistance to weathering, to be washable, and possess excellent surface hardness and abrasion resistance. It is available in white and 12 pastel shades.

Further particulars can be obtained from Allweather Paints Limited, 36, Great Queen Street, London, W.C.2.

NEW ELECTRODE

A new electrode, known as the "Diam Emerald," has been introduced for either contact or free-arc use. It is available for general-purpose welding on all thicknesses of mild steel from 14 s.w.g. upwards. The lighter gauges of electrode may be used in all positions.

This electrode is reported to be characterised by the production of fillet welds of mitre profile, a self-releasing slag, a wide current range, and a

high burn-off rate at normal currents.

Mechanical properties of deposited metal include a yield point of 24/28 tons/sq. in. and an ultimate tensile strength of 29/34 tons/sq. in. Elongation on 1.5 in. gauge length is 26/32 per cent; the reduction of area on 0.424 in. dia. being 40/50 per cent. The Charpy impact value is 40/60 ft./lb. A chemical analysis of the weld metal is carbon 0.08-0.10 per cent, silicon 0.11-0.14 per cent, manganese 0.55-0.65 per cent, sulphur 0.025-0.035 per cent and phosphorous 0.015-0.025 per cent.

Further particulars may be obtained from Cooper & Turner Limited, Vulcan Works, Vulcan Road, Sheffield, 9.

SOCKET WRENCHES

The illustration shows a large Britool power-operated socket wrench for nuts with a width of $7\frac{1}{2}$ in. across the flats.

The original steel-bar content to produce a socket of this size weighed almost 3 cwt. and had an outside dia. of 12 in.

Socket wrenches are available in standard sizes down to 1.52 in. across flats.

Further details may be obtained from Britool Limited, Bushbury, Wolverhampton.



Public schoolboys and railway careers

Twenty public schoolboys recently spent four days on the London Midland Region of British Railways. They toured railway installations in the Derby, Crewe and Coventry areas, questioned railwaymen at work and off duty, and discussed their experiences, as well as railway matters generally, with trade unionists and management representatives.

The main object of the visit was to provide an introduction to industry and to help them to appreciate the many facets of a nationwide organisation.

The boys visited Crewe electric traction depot, where they saw some of the Manchester-Crewe locomotives being serviced, Crewe Works training school, Sandbach power signalbox, which controls about 13 route miles of line, and Toton marshalling yard, where the equipment in the "hump" room was a special attraction.

They also saw Derby St. Mary's goods depot and Derby district control, and travelled in inspection saloons to visit a number of new installations including Leicester Queen Street freight terminal, the new Rugby flyover and the reconstruction at Coventry Station.

Parliamentary Notes

Government's assurances under economic policy

The debates in the House of Commons on the economic situation on July 26 gave considerable consideration to the position of the railways in particular, and the nationalised industries in general, arising from the Chancellor of the Exchequer's pronouncement on the previous day that he wanted some immediate contribution from the public sector towards lightening the present overload on the economy.

Mr. Selwyn Lloyd explained that in making these adjustments, priority must be given to what directly affects national efficiency, and that programmes under way are not wastefully disrupted.

Increased efficiency

Opening the debate on July 26, he said (dealing with nationalised industries) that the Government policy was laid down in the April White Paper. Financial targets were being discussed with the industries and it was hoped to reach agreement with them by the autumn.

This policy would lead to more effective concentration upon productive efficiency in the use of labour and capital. As a result of increased efficiency and higher earnings, it was expected that the calls of these industries on the Exchequer for finance would be progressively and substantially reduced over the next five years in spite of substantial increases of investment in some cases. To help the industries to carry out this policy the Government would leave them as much freedom and responsibility as possible in fixing their prices.

Mr. Ray Gunter, of the Salaried Staffs Association, spoke, at the close of the day's



Explanation of operation of control panel in control tower at Toton Yard

debate, of the railwaymen's claim, remarking that all that the railwaymen would ask for when they meet Dr. Beeching on August 21st was that that comparability of wages with other industries should be maintained.

Mr. Joseph Grimond, Leader of the Liberals, said that an investment board for the nationalised industries was needed. He was glad the Chancellor would try to maintain a steady rate of investment in these industries.

Mr. David Webster (Weston-super-Mare—Con.) said he looked forward very much next year to a Bill coming before the House to give the B.T.C. the right to develop its surplus properties, and, if necessary, to sell them, so that the benefits should accrue to the taxpayer. There was also the need to look at the hotel side of the Transport Commission, which was earning considerably less than the interest charges on the capital employed.

Mr. Ray Gunter (Southwark—Lab.) said that some form of national planning board was required, because in many industries there was a deep sense of insecurity. He did not believe that Government Departments were in a position, because they had not the experts, to form judgments about some of the great projects of the nationalised industries. The Minister of Transport and his Department had proved over the past six years that they were incompetent or, at least, ill-equipped, to deal with the problems of modern transport. He would say to some of his trade union friends that some of their practices were not very helpful. There was an atmosphere in too many spheres of industry today of "couldn't care less." He had no complaint against Dr. Beeching. He had been in contact with him in the machinery of negotiation on a few occasions lately. He appeared to be a powerful, authoritative, able and fresh man, who would probably bring fresh ideas to transport.

Questions in Parliament

Manchester-Liverpool-Euston lines

Mr. Ellis Smith (Stoke-on-Trent, C.—Lab.) asked the Minister of Transport on

July 26 if the total capital expenditure required to modernise and electrify the main lines between Manchester and Crewe, Liverpool and Crewe, and Crewe and Euston had been authorised.

Mr. Marples, in a written answer, stated that as announced in the debate on the nationalised transport undertakings on January 30, the Government had given general approval to this scheme.

Mr. Ellis Smith asked the Minister of Transport what capital expenditure he had authorised or intended to authorise to modernise and electrify the line which connects Piccadilly, Manchester, main line with Ordsall Lane, linking up Exchange and Victoria Stations, and to provide for direct and indirect through running between the electrified lines at Piccadilly, Manchester, and Liverpool.

Mr. John Hay, Parliamentary Secretary, Ministry of Transport, said that the answer was none.

Mr. Ellis Smith asked if the Parliamentary Secretary agreed that density of population in this area was the greatest in the country, if not in the world, and that revenue where modernisation had been applied had already increased by between 50 and 70 per cent. ? In view of the urgent needs of people who render great service to the country's export trade, should not the Commission concentrate on this area to carry modernisation to the maximum extent ?

Mr. Hay told him that if he had a suggestion to make to the Commission about the electrification, the proper course was to approach the Commission direct.

Electrification projects in Staffordshire

Mr. Ellis Smith also asked the Minister of Transport what capital expenditure he had authorised to electrify the North Staffordshire loop line, for the construction of a main line by-pass diversion of Harecastle tunnel, and for electrification of the main line that runs through Stoke-on-Trent.

Mr. John Hay said that no proposals had been submitted by the British Transport Commission for the electrification

MOULDING CABLE CONDUIT COVERS



Moulds of Bakelite polyester resin-reinforced glass fibre to which editorial reference is made this week

of the North Staffordshire loop line. The London Midland Region electrification scheme, which had been given general approval, included the electrification of the main line through Stoke-on-Trent. The Commission are planning to by-pass the Harecastle tunnels.

Marshalling yard at Crewe

Mr. Ellis Smith asked the Minister of Transport what capital expenditure he had authorised to increase the acceleration of goods traffic from North Staffordshire; and whether it was intended to modernise the Stoke to Madeley line so that goods traffic could be carried via Crewe.

Mr. Marples, in a written answer, stated that he had authorised the re-modelling of the marshalling yard at Crewe (Basford Hall) at a total cost of £280,000. In association with this scheme a new line to link the Stoke-Market Drayton line with the Stafford-Crewe line at Madeley would, it was hoped, be in operation by the end of this year.

Railway goods centre at Stok

Mr. Ellis Smith asked the Minister of Transport on what date he gave capital sanction for the construction of the new Stoke railway goods centre; and what applications he had had for capital sanction to extend the new centre or to build another.

Mr. Marples, in a written answer, stated that the British Transport Commission authorised the project on December 18, 1958. At that date individual projects were not submitted to him for approval. No applications for authority to extend this railway goods centre or to build another had been received.

Railway relics and archives

Lord Montagu of Beaulieu asked H.M. Government in the House of Lords on July 25

what, in view of the future reorganisation of the British Transport Commission, was going to happen to the relics and archives now owned or cared for by the Commission.

Lord Chesham, Parliamentary Secretary, Ministry of Transport, said that this was one of the matters which the Minister of Transport was at present considering in connection with the forthcoming legislation on the reorganisation of the British Transport Commission.

B.T.C. letting of railway houses

Mr. Hector Hughes (Aberdeen N.—Lab.) asked the Minister of Transport if he would give a general direction to the British Transport Commission to undertake the immediate repair, with a view to letting, of all untenanted houses in their possession.

Mr. Marples said that this was a matter of management for the Commission.

Staff & Labour Matters

Claim for a shorter working week by railway workshop staff

The claim of the Employees' Side of the Railway Shopmen's National Council for a 40 hour week for Railway Workshop staff was heard at the Industrial Court on Thursday last, August 3.

The present standard weekly hours of Railway Workshop staff are 44 and the British Transport Commission have offered to consider a working week of 42 hours, provided ways and means can be found of reducing the impact of a shorter working week and of keeping the cost within reasonable limits. They suggested that a joint working party should be set up to examine the position.

The Employees' Side were dissatisfied with this offer because the Commission were not prepared to specify beforehand the date from which the reduced hours should become effective and they have therefore referred their original claim, which is for a four hours reduction in the standard week, to the Industrial Court.

The N.U.R., & A.S.L.E. & F. have agreed to a similar offer by the Commission on behalf of Railway Conciliation staff and the first meeting of the Joint Working Party to consider the position has already been held.

WITHDRAWAL OF PASSENGER TRAIN SERVICES

The Eastern Region of British Railways is to withdraw passenger train services from stations on the Peterborough-Grimsby line as follow: Hainton Street Halt, Waltham, Holton Village Halt, Ludborough, Utterby Halt, Fotherby Halt, Authorpe, Aby, Little Steeping, Eastville, Sibsey, Kirtton, Algar-kink, Surfleet, Littleworth, St. James Deeping, and Peakink. On the Doncaster-March line the following stations will be closed to passengers: Finningley, Misterton, Stow Park, Blankney & Metheringham, Digby, Ruskington, Donington Road, Gosberton, Pinchbeck, Cowbit, Postland, and French Drove & Gedney Hill.

BULK TRANSPORT IN SOUTH AFRICA



Bulk cement semi-trailer in use with South African Railways

CONTRACTS AND TENDERS

£400,000 improvement contract with Pakistan Railways

Gammon Pakistan, a member of the Gammon group of companies, has been awarded the contract for the civil engineering work in connection with Karachi circular railway project, which has been designed to improve transport facilities in the areas surrounding Karachi, due to the industrial and commercial expansion in Pakistan. The contract is being carried out for the railway department of the Pakistan Government and valued at about £400,000. The scheduled date for completion of the contract is September, 1962.

The German wagon works, Linke-Hofmann-Busch, of Salzgitter-Watenstadt, has received an order from Pakistan Railways for 120 rail passenger carriages, two Pullman coaches and twelve motor-rail coaches and tenders. The order is worth about £2,100,000.

M.A.N., Nuremberg Works, has received an order from the Danish State Railways for two eight-car air-conditioned *de luxe* diesel-hydraulic trains for fast services between Copenhagen and the northern and western areas of Jutland. Each train is to have two Maybach 1,100 b.h.p. engines, Voith transmission, Luwa air-conditioning, and Knorr air brakes supplemented by electromagnetic rail brakes. Two additional 300 b.h.p. diesel-generator sets are to be installed for train services. Including four additional trailers, spare bogies and other parts, the order is stated to be worth DM.1.2 million.

British Railways, Eastern Region, has placed the following contracts:—

Paterson Hughes Engineering Co. Ltd.: supply, delivery and installation of one sleeper de-chairing conveyor at Chesterton Junction Central reclamation depot;

Thomas Fletcher & Co. Ltd.: repairs to brickwork of bridge No. 212 under main lines, between Little Bytham and Corby Glen;

Arundel (Contractors) Limited: cleaning and painting of bridges and overhead signal masts, between Dunford Bridge Station and Darnall Station;

W. & C. French Limited: provision and driving of steel sheet piling, between Medge Hall and Althorpe;

D. P. O'Neill Limited: cleaning and painting of station buildings and structures at Leigh-on-Sea, Chalkwell, and Pitsea stations;

L. G. Howell: cleaning and painting of buildings, structures, etc. at Southend (East), Thorpe Bay and Shoeburyness, cleaning and painting of station buildings at Southend (Central) Station;

T. E. Cundy & Son Ltd.: cleaning and painting of sheds, buildings, etc. at Ilford electric train depot;

Charles R. Price: construction of work-

shop block and stores at Marshgate Yard, Doncaster;

Wade Construction Co. Ltd.: alterations to electric locomotive shed and construction of diesel fuelling facilities at Wath-upon-Deane;

Lehane, Mackenzie & Shand Limited: earthworks, drainage, fencing, bridge-works, in connection with the provision of a new marshalling yard at Tinsley, Sheffield.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Argentina:

1,037½ tons steel sheets and angles for bridge works.

The tender No. is 40/61. The closing date is August 22, 1961. The Board of Trade reference is E.S.B./24323/61.

2,675 tons steel angles

1,025 tons steel sheets

These angles and sheets are required for the reconstruction of railway coaches, box-cars, and wagons.

The tender No. is 39/61. The closing date is August 18, 1961. The Board of Trade reference is E.S.B./24322/61. The issuing authority for the above tenders is the Empresa Ferrocarriles del Estado Argentino (Argentine State Railways). Bids should be sent to Seccion Licitaciones, Empresa Ferrocarriles del Estado Argentino, Avenida Corrientes 389, Buenos Aires.

From Australia:

6 diesel-electric locomotives, 3 ft. 6 in. gauge main-line, mixed traffic.

The issuing authority is the Western Australian Government Railways Commission. Bids should be sent to the Secretary, Western Australian Government Tender Board, 74 Murray Street, Perth. The tender No. is 477A-1961. The closing date is September 28, 1961. The Board of Trade reference is E.S.B./24336/61.

From Pakistan:

132,220 train lighting lamps of various sizes.

The issuing authority is the Chief Controller of Purchase, Pakistan Western Railway, Empress Road, Lahore, to whom bids should be sent. The closing date is August 17, 1961. The tender No. is P-802/P2/6/61. The Board of Trade reference is E.S.B./24050/61.

From South Africa:

685 tons of soda ash for water treatment.

The closing date is August 11, 1961. The tender No. is E.8797. The Board of Trade reference is E.S.B./24001/61.

200,000 sawn and/or hewn sleepers, 6 ft. 9 in. x 10 in. x 5 in., in accordance with specification No. CCE.1/15-1961.

The closing date is August 18, 1961. The tender No. is A.8618. The Board of Trade reference is E.S.B./24341/61.

3 timber seasoning kilns.

The closing date is September 8, 1961. The tender No. is F8694. The Board of Trade reference is E.S.B./24047/61.

6 electric tyre heaters to accommodate locomotive, carriage, wagon and bogie tyres, ranging in size from 2 ft. 3½ in. to 5 ft. 3 in. diameter over the tread

2 spare thermocouple assemblies complete with protective sheaths, terminal blocks and protective covers

spare valves and indicator lamps for the electronic control unit

spare parts (to be detailed and quoted for separately) clause 23-0 of Electrical Specification No. E.N.W.798/61.

velograph prints as per clause 22-3 of Electrical Specification ENW. 798/61.

The closing date is August 25, 1961. The tender No. is 8593. The Board of Trade reference is E.S.B./24045/61.

1 electric motor driven heavy duty single pulley all geared headstock, gap bed, centre lathe, suitable for the turning of axles locomotive return arm cranks, etc., as called for in Mechanical and Electrical Specifications.

The closing date is August 25, 1961. The tender No. is G.8734. The Board of Trade reference is E.S.B./24046/61.

Sawn crossing timbers, in accordance with specification No. CCE.1/15-1961 (amended March, 1961)

10,000 nos. 8 ft. x 10 in. x 5 in.

15,000 nos. 9 ft. x 10 in. x 5 in.

10,000 nos. 10 ft. x 10 in. x 5 in.

9,000 nos. 11 ft. x 10 in. x 5 in.

7,000 nos. 12 ft. x 10 in. x 5 in.

5,000 nos. 13 ft. x 10 in. x 5 in.

600 nos. 20 ft. x 10 in. x 5 in.

The closing date is August 11, 1961. The tender No. is A.8617. The Board of Trade reference is E.S.B./24048/61. The issuing authority for the above tenders is the Stores Department, South African Railways, and tenders should be sent to the Chairman, Tender Board, S.A.R., P.O. Box 7784, Johannesburg.

From Thailand:

2,000 pairs of fishplates for 60 lb./yd. rails.

The issuing authority is the State Railways of Thailand, Yod-Se, to whom bids should be sent. The tender No. is 04211. The closing date is September 4, 1961. The Board of Trade reference is E.S.B./23775/61.

From Turkey:

5 underground diesel locomotives.

The issuing authority is Türkiye Komur Isletmeleri Kurumu, Etibank Binası, Sıhhye, Ankara, Turkey, to whom bids should be sent. The closing date is September 7, 1961. The tender No. is 116.EKD/3341. The Board of Trade reference is E.S.B./24016/61/D.L.F.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

The British Electric Traction Co. Ltd.

Profits again increased. Satisfactory year for bus companies under difficult conditions

The 65th annual general meeting of the British Electric Traction Co. Ltd., was held on July 27, 1961, in London. Mr. H. C. Drayton, Chairman of the company, in the course of his address said:—

When I met you in July, 1957, I finished my speech by telling you that the previous two years had been a time of sowing, and that the seed we had planted we expected to harvest in the next few years. The profit which I had to report to you at that meeting for the year ended March 31, 1957, was, before taxation, £3,923,000. As you have seen from the report which we are laying before you today the comparable profit before taxation is £6,800,000, an achievement of which we, the stockholders, the executives and the directors can be proud. Also the stockholders have not been left out of this harvest as the dividend they received for the year ended March, 1957, was 25 per cent and the dividend your directors are recommending for this year is 50 per cent.

If you endorse this recommendation, there will remain a balance of profits attributable to the company and retained by subsidiary companies of £767,000, and an amount to be added to the company's Undivided Profits Account of £603,000, making in all £1,370,000 retained.

Mr. W. T. James, who had passed normal retiring age, resigned from the board during the year. He joined the executive staff of the B.E.T. in 1943 and the board in 1948, having previously been General Manager of the Western Welsh Omnibus Company. The Directors desire to place on record their appreciation of Mr. James's service to the company and I would like to pay a personal tribute to him. I was responsible for acquiring the business of Lewis & James, of which he was a partner, which later became part of the Western Welsh Omnibus Company. He and I were great friends, and we both had great pride in the achievement of starting and building, in its early days, that company. Needless to say, I wish him a long and happy retirement, and I am sure you will join with me in those wishes.

Bus interests at home

Our bus companies in England had a satisfactory year in 1960, although we were obliged to seek increased fares to meet the cost of the substantial wages settlement negotiated by the Unions in May, 1960. We also were hit by the bad weather of last summer which was not conducive to people travelling by bus. However, in spite of the weather, the total number of passengers carried by our bus companies in 1960 declined only by one-half per cent compared with 1959.

The wages settlement in May, 1960, was the largest ever negotiated in the provincial bus industry. In November, 1960, however, another claim was lodged for a substantial

increase in wages and for improved conditions. This was rejected by the employers but in April this year the Unions re-submitted their claim and it was agreed to take it to arbitration. The award, which was published in May, granted an immediate increase in basic rates and also other benefits, and it is estimated that these, together with consequential increases to other employees, will cost our companies some £2,000,000 in a full year. We have therefore reluctantly been obliged to make further applications to the Traffic Commissioners for increased fares. The May, 1960, settlement and this latest award have together raised the level of our wage costs by no less than 18 per cent in a little over 12 months.

As I have told you before, approximately 40 per cent of our route mileage is operated at a loss. We have accepted this obligation as it is part of the service we perform to the public, and we recoup any loss from our remunerative routes. Whenever we get increased costs, it has three effects upon our business: it puts that route mileage which is already in the red more in the red; it brings the marginal route mileage into the red, and it reduces the profit on the profitable mileage. Thus we have less elbow room to run losing route mileage, and consequently those routes have to be cut.

The Minister of Transport appointed a committee known as the Jack Committee to investigate the problems of rural services. They recommend that these services should be given direct financial aid, the cost to be borne partly by the Exchequer and partly by the county councils. Three members of the committee submitted minority reports in which they recommend remission of the duty on fuel oil, which would seem to be sensible. Up till yesterday we paid 2s. 6d. a gallon fuel tax to the Government; it has now been increased to 2s. 9d. a gallon. This tax is a big percentage of our costs and plays its part in the decision taken as to the percentage of losing route mileage we can absorb.

In effect, what the Jack recommendation says is that we should continue to pay to one Government department money in the form of fuel tax, and then another Government department will pay out sums to subsidise losing routes. I was going to say I could not see any merit in this scheme, but I suppose there is one merit which one cannot overlook and that is, if it is put into effect, it will need the services of a number of people, all of them non-producing, to collect the money, work out how much should be allocated and pay it back again to our companies who pay the tax; and this at a time when we need the services of every man and woman in this country on the production side.

I do not think it is quite realised that the bus industry pays a duty of 2s. 9d. a gallon on fuel oil which is not imposed on other forms of public passenger transport, and this

duty represents an addition of approximately 275 per cent to the basic cost of our fuel; this is some five times higher than the highest rate of purchase tax which is only 55 per cent.

During the year the Mexborough and Swinton Traction Company replaced the last of its trolley vehicles with modern diesel buses. I was present at the ceremony when the trolley system was closed down and had the doubtful pleasure of driving the last trolley bus. This was the last remaining company-owned system in the country and the last electric-transport undertaking of the B.E.T. Company.

Overseas Interests

Although we had a little better year in Canada and the profits of Canadian Motorways were a little higher, they are still unsatisfactory and the return on the money we have invested infinitesimal. The country itself has been through a hard time, and trade and industry had not shown any signs of recovery up to the time the company's year ended, which was on December 31, 1960.

Canada has been a disappointing field to us, although perhaps our experience is better than that of a number of other people who have ventured into that country. I cannot hold out the prospect that this year is going to be very much better than the year to December, 1960. Unless there is an upward surge in the economy of Canada, I do not look for materially increased results.

In East Africa, where our interests are looked after and operated by our friends, United Transport Co. Ltd., the companies there showed only slightly less than the record profits of the previous year and we received the same rate of dividend.

Rhodesia United Transport had another successful year, in spite of the political difficulties and the dividend we received was satisfactory.

When we went into Kingston, Jamaica, to operate the bus service there, I think the best way to describe it was that it was in extremely poor shape. New buses were ordered, a proper maintenance and engineering department was put in and the number of passengers carried increased, resulting in a reasonable return to the shareholders on their investment. Since 1953, we have had a number of wage increases, the last one being in 1960. Yet another wage claim has been lodged by the Union since the end of the year and this is being referred to arbitration. The company has managed to operate at fares which have remained unaltered since we took over in 1953, but it must be understood that any further increase in wages can only bring nearer the day when we shall be forced to seek additional revenue through an upward adjustment of fares.

Other Interests

Our subsidiary, Advance Laundries Limited, had a record year in 1960, when the profits rose by more than 50 per cent compared with 1959. Whilst more than half

of the improvement was derived from our "Towelmaster" service and linen hire services, I am pleased to say that both the laundry and dry cleaning sections contributed substantially to the increase.

The progress for the current year to date is encouraging, and I can see no reason to suppose that 1961 will not show a further expansion in business and profits, but I cannot pretend that it will necessarily be as great as in 1960.

The Rediffusion Company, in which we have a large interest, had a successful year and the dividend was increased. As the final dividend is not paid until after the end of our own company's year, the full effect of such increase is not reflected in the accounts before you, but will fall into the accounts for the current year.

Associated-Rediffusion Limited in which as you know we are heavily interested both by our direct holding of 50 per cent of the capital and by an indirect holding through

Rediffusion, has produced us additional revenue in the year under review.

Two days ago, Associated-Rediffusion Limited announced its results for the year ended April, 1961, which were extremely satisfactory. The final dividend which was declared will fall into our current year's revenue, and provided the company maintains its interim dividend, will mean an increase in revenue for our Company for the current year.

When we purchased the capital of Eddison Plant Limited in 1949, its main business was the hiring out of road rollers to contractors and municipal authorities. Since then, we have been steadily improving and widening its sphere of business, particularly in the field of contractors' plant. Today we have 16 depots, and we claim we have the country's largest hire fleet of contractors' plant, including road rollers, and provide unsurpassed national coverage.

For its year ended March, 1961, the

company had a record year and revenue and profits both showed considerable increases compared with the previous year. Both during the year under review and since the end of our year, we have subscribed further capital to provide the necessary finance for the expansion of this business.

Current Year

When we come to the current year, I think I have indicated to you certain directions in which we can look for increased profits.

There can be disappointments and Canada could be one of them, although I must point out that it could be a revenue producer for the future. However, taking it all in all, I shall be disappointed when we meet next, if the results do not show an increase, but you must not expect such a big increase as in the year under review. The report and accounts were adopted.

NOTES AND NEWS

First-aid classes. British Railways, North Eastern Region report that 179 classes were held last winter and 3,278 students passed a first-aid examination.

Swiss restaurant cars. The Swiss Restaurant Car Company is now supplying the restaurant cars on the Bale-Chiasso trains.

Western Region holiday trains. The Western Region of British Railways is to run nearly 100 special long-distance trains over the Bank Holiday period this year.

C.N.R. operating deficiency. A net operating deficiency of \$2,022,000 is reported by Canadian National Railways for the month of May, 1961. The net operating deficiency for the same month last year was \$496,000.

Train derailed. A passenger train was derailed at Apsley Guise, on the Bletchley-Bedford line of the London Midland Region of British Railways, when it ran into a motor vehicle on the level crossing. The driver of the motor vehicle was injured, his passengers were thrown clear and suffered shock and bruising.

Level crossing accident at Pitsea. A lorry driver was killed and a pedestrian seriously injured, when a train collided with a lorry on an un-manned crossing outside Pitsea station on July 30. The train was taken out of service but no passengers were injured. Normal working was resumed after a delay of $\frac{1}{2}$ hour.

Commissioning ceremony. Lady Renison, wife of Sir Patrick Renison, the Governor of Kenya, acted as Commissioning Mistress on July 22 when she named the r.m.s. *Victoria*, built in Glasgow for the East African Railways & Harbours, Lake Victoria Marine Services.

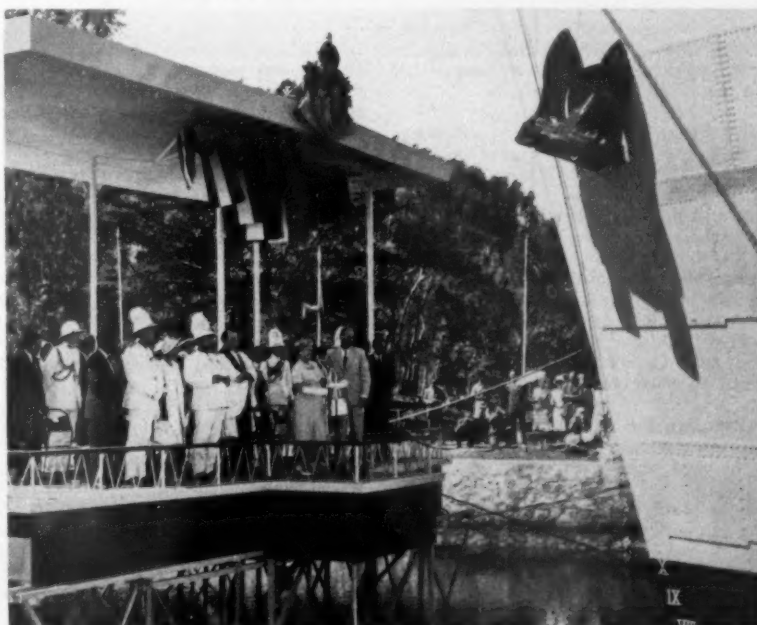
B.T.H.A. reorganisation. Mr. J. G. Bridges, Director General, British Travel & Holidays

Association, has been seconded to review and report on overseas development. As a consequence Mr. L. J. Lickorish has been redesignated General Manager; Mr. W. J. Penny is to be Financial Controller & Secretary, and a new division called Sales, Circulation, Advertisement, & Distribution has been created.

London Bridge plan. The proposal by the City of London to widen London Bridge by 25 ft. is linked with a £4 million redevelopment plan for London Bridge Station. This

will provide for one-way traffic round the station, and raised footways for pedestrians. British Railways, Southern Region has approved the plan and it is now before the London County Council for outline planning approval.

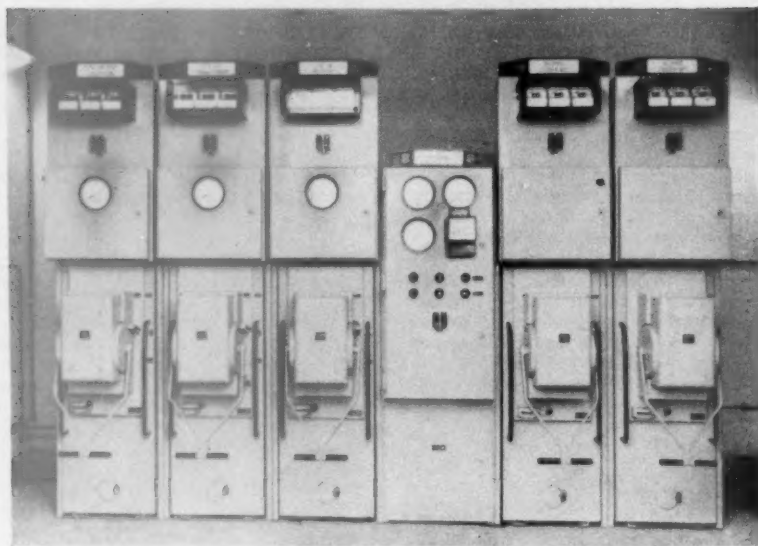
Increased speed limit for buses. The Motor Vehicles (Variation of Speed Limit) Regulations 1961, Statutory Instrument No. 1961/1377, which came into force on July 26, has raised the speed limit for buses and coaches from 30 to 40 m.p.h. on roads not



Lady Renison, wife of the Governor of Kenya, naming the r.m.s. *Victoria*

EQUIPMENT AT DONCASTER WORKS

(See our June 30, issue)



Main high-tension switchboard supplied by Crompton Parkinson Limited to Doncaster Wagon Works, British Railways, Eastern Region

otherwise restricted. The regulations apply to all passenger vehicles having an unladen weight of over 3 tons, or adapted to carry more than 7 passengers exclusive of driver.

Alfred Herbert Limited has taken over the issued share capital of William Whiteley & Sons Ltd., of Huddersfield.

Pipes and pumps exhibition. The Pipes, Pipelines, Pumps & Valves Exhibition & Convention is to be held at Earls Court, London, from April 9-13, 1962.

Overseas visitors in May. The British Travel & Holidays Association has announced that more than 170,000 overseas visitors came to Britain in May, 10 per cent more than in May last year.

Rail bookings increased. Passenger bookings in the Tyne & Wear Traffic Area of the North Eastern Region of British Railways increased 2½ per cent in the first six months of this year and parcels bookings increased by 14 per cent in the same period.

Railway Benevolent Institution. At its meeting on July 24 the board of the Railway Benevolent Institution granted annuities amounting to £192 10s. a year, and gratuities amounting to £1,695. Grants from the Casualty Fund during June amounted to £1,027.

Extra coach for "The Caledonian." An extra second class coach has been added to the eight coaches of "The Caledonian," the express between London-Glasgow, on the London Midland Region of British Railways. The train now has 168 second class seats.

Continental autumn tours. The North Eastern Region of British Railways is to run tours to Holland this autumn. There will be two tours, one giving two full days in Holland, and the other three. Further tours are planned if the original two are well patronised.

Brussels Machine-Tool Exhibition. H. W. Ward & Co. Ltd. will show a representative selection from its range of capstan and turret lathes at the forthcoming 7th European machine-tool exhibition at Brussels. All the capstan lathes embody the new Ward double-slide capstan. The largest machine on show will be a combination turret lathe with a spindle bore of 5½ in. For the first time a Ward lathe of this size will be used to demonstrate hydraulic copy turning.

Railway Stock Market

Stock markets moved sharply lower and many shares have reached new low levels for the year due, in a large measure, to disappointment at the absence of any definite measures by the Chancellor of the Exchequer to help export trade.

Featured among foreign rails has been a fresh rise from 19½ to 21 in Antofagasta ordinary stock, which remained under the influence of the raising of the dividend from 2 per cent to 3 per cent, while the preference stock rose from 34 a week ago to 36. The 4 per cent perpetual debentures were again quoted at 39½. United of Havana second income stock was good again with a fresh rise from 6½ to 7½; the consolidated stock remained at 1½.

Costa Rica ordinary stock was again 40½, with the 6½ per cent first debentures 95½. Chilean Northern 5 per cent first debentures kept at 50, Guayaquil & Quito assented bonds at 58½ and Paragway Central prior debentures at 18½. Brazil Railway bonds were fractionally lower at 3½. San Paulo Railway 3s. units remained at 2s. 3d. and Mexican Central "A" bearer debentures at 59. Elsewhere, Midi 4 per cent sterling bonds were 84½.

International of Central America shares receded from \$19½ to \$17½, but the preferred stock improved from \$103½ to \$106.

Helped by the trend of Wall Street and the improvement reported in the U.S. business trends, Canadian Pacifics have rallied afresh from \$44½ to \$45½. The preference stock, however, lost a point at 53, and the 4 per cent debentures at 52½ compared with 53 a week ago. White Pass shares were 11½.

In other directions, Nyasaland Railways shares have moved up from 9s. 6d. to 10s. 6d.; the 3½ per cent debentures remained at 32. Midland of Western Australia £1 units of second debentures kept at 11s. 6d. West of India Portuguese capital stock was 117.

Shares of locomotive building and engineering companies lost ground with the prevailing stock market trend, but declines were no larger than in most other groups of shares: business was reported to be on a moderate scale though with selling predominating.

Compared with a week ago, Wagon Repairs 5s. shares, however, have been maintained at 21s. 6d., but Gloucester Wagon 10s. shares eased from 8s. 6d. to 8s. 3d. and G.D. Peters were marked down from 19s. 4½d. to 18s. 9d. On the other hand, Beyer Peacock 5s. shares firmed up from 7s. 3d. to 7s. 4½d., though Charles Roberts 5s. shares declined from 6s. 3d. to 5s. 6d. Moreover, Birmingham Wagon came down further from 22s. to 21s. 4½d., and North British Locomotive from 6s. 3d. to 5s. 9d.

Westinghouse Brake were 33s. 6d. compared with 34s. 3d. a week ago. In electricals, G.E.C. remained under the influence of the lower profits, and at 29s. 6d. compared with 31s. a week ago. A.E.I. declined with the general trend from 38s. 3d. to 35s. 9d. and English Electric from 32s. to 30s. 9d. B.I.C.C. fell on balance from 56s. 9d. to 55s. 3d.

Pressed Steel 5s. shares were 21s. compared with 22s. 7½d. a week ago and Dowty Group 10s. shares lost 1s. 3d. at 33s. 6d. Pollard Bearing 4s. shares at 35s. 6d. were maintained on balance, and Ransome & Marles 5s. shares at 15s. Stone-Platt were steady at 50s. 3d. Leyland Motors came back from 94s. 3d. to 92s. 9d.

Forthcoming Meetings

August 26 (Sat.). The Railway Enthusiasts' Club, tour of interesting lines in the London area. Open to non-members.

Sept. 2 (Sat.). Permanent Way Institution, London Section. Visit to Southampton Docks.

Sept. 16 (Sat.). The Permanent Way Institution, East Anglia Section, visit to Permali Limited, Gloucester.

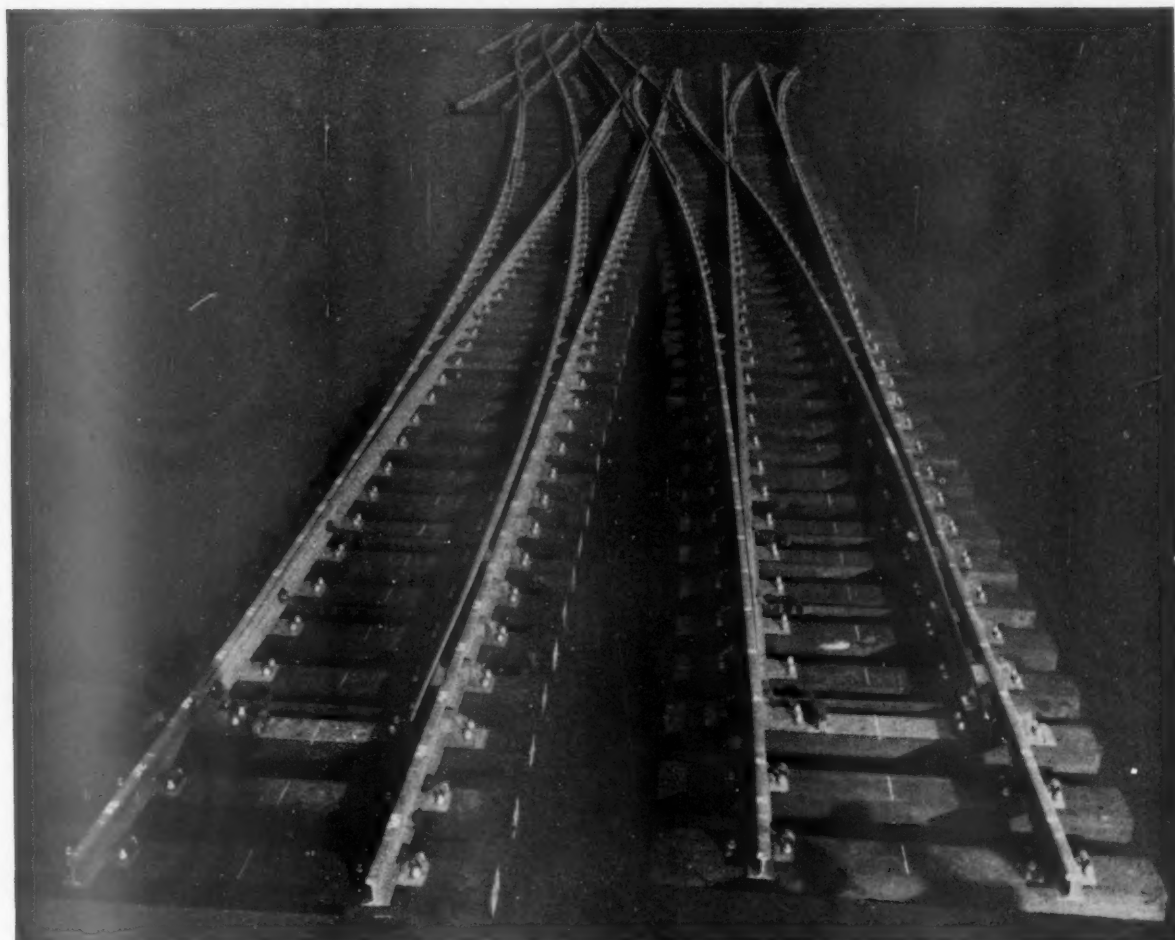
Sept. 16 (Sat.). The South Bedfordshire Locomotive Club, special train over the freight-only, Welwyn Garden City to Hertford branch.

Sept. 21 (Thu.). The Model Railway Club, film show, at Keen House, Calshot Street, N.I.

OFFICIAL NOTICES

REPRESENTATIVE required by London firm representing provincial manufacturers of railway products. Apply Box 206, The Railway Gazette, 33 Tothill Street, London, S.W.1.

SWITCHES and CROSSINGS



Photograph by courtesy of the Chief Civil Engineer, Eastern Region.

JUNCTION AT ROMFORD
ON THE LIVERPOOL
STREET-NORWICH MAIN
LINE, EASTERN REGION,
BRITISH RAILWAYS.

This junction, comprising Main to Electric crossover lines, has been manufactured by us from the new B.S. 110A. F.B. rail incorporating the latest design of switches with "foot-planed" stock rails, also the improved type of Mills C.3. clip fastenings and plastic ferrules.

The photograph shows the material built up and timbered at our works for inspection, to the exact requirements of the Chief Civil Engineer.

We specialise in the manufacture of switches and crossings; single, double and outside slips; tandem, threethrow and simple turnouts; scissors crossovers and layouts of any description.

TAYLOR BROS. (SANDIACRE) LTD.
MIDLAND FOUNDRY, SANDIACRE, NR. NOTTINGHAM

Telephone: SANDIACRE 3141 (5 lines)

ESTABLISHED 1858

Telegrams: TAYLOR BROS. SANDIACRE

LONDON OFFICE:

59 GORDON SQUARE, W.C.1

Telephone: MUSEUM 2821

Telegrams: TORRIDITY LONDON



It sticks out a mile!

This is a carbon world—it sticks out a mile. Carbon in ships, carbon in trains, carbon in motor cars, carbon in aircraft; carbon in electrical generation; carbon in current collection; carbon in washing machines and vacuum cleaners; carbon in telephones, pumps, radios and refrigerators; atomic carbon, mechanical carbon, electrical carbon—always carbon is somewhere at work. In the last fifty years, we have put carbon on the map. We have adapted it to the needs of so many industries that now our MORGANITE carbon products are known throughout the world. Their quality, reliability and consistency are outstanding.



Morganite Carbon Limited

A Member of The Morgan Crucible Group.

BATTERSEA CHURCH ROAD
LONDON S.W.11
BATTERSEA 8822

C61A/706

**WOOLWORTHS USE
BRITISH RAILWAYS
MODERN FREIGHT SERVICES**

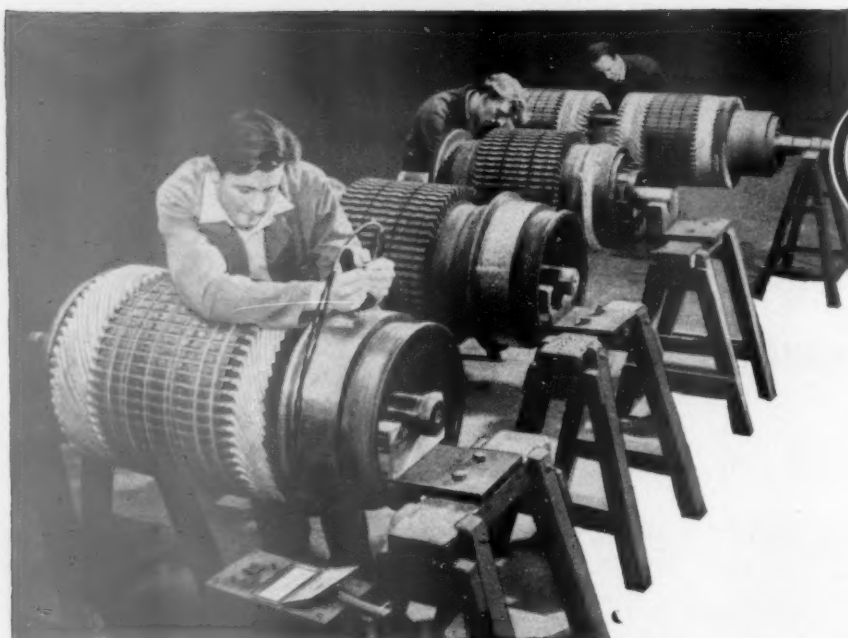


F. W. Woolworth and Co. Ltd. are one of the largest retailing organisations in the country. They transport many thousands of tons of goods every year by rail – goods whose variety is well known to all who patronise their stores!

EXPRESS FREIGHT TRAINS. There are more than 800 every day—many giving next morning arrivals over long distances. Charges are fully competitive. Ask your local Goods Agent for details.

EXPORT EXPRESS. From many towns British Railways Export Express services give assured NEXT-DAY DELIVERY for wagon-load traffic to London Docks (Royal, India and Millwall Groups), Merseyside, Manchester, Goole, Hull, Glasgow, Grangemouth and Southampton.

BRITISH RAILWAYS



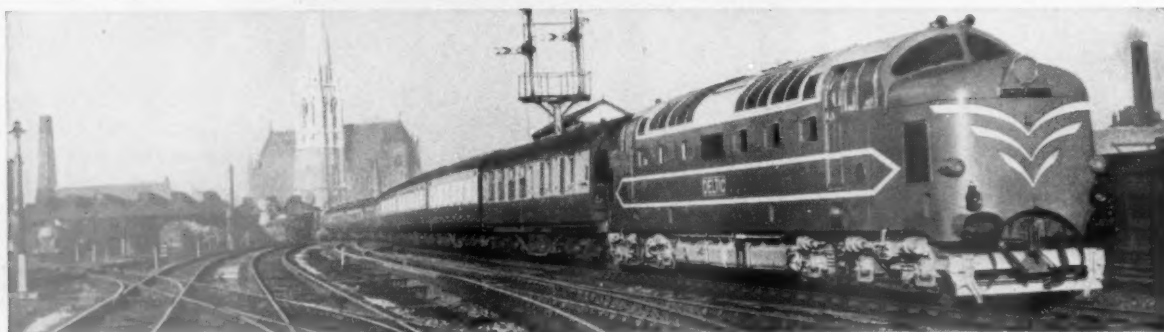
for all
Traction
Motor
repairs

Head Office: Empire House, 10 Charlotte Street, Manchester, 1
Telephone: CENTral 1378 (3 lines) and CENTral 3641 (2 lines)

BRITISH ELECTRICAL REPAIRS LTD

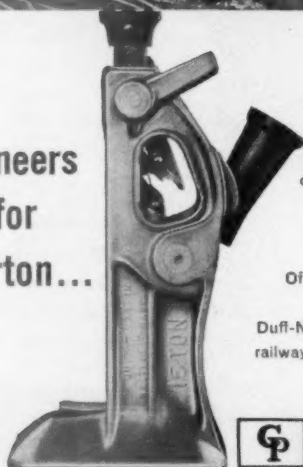
Works at: Bath, Birmingham, Cardiff, Chesterfield, Edinburgh,
Glasgow, Hawick, London, Manchester, Newcastle-upon-Tyne, Swansea.

dm BER 113



Photograph by courtesy of The English Electric Company

railway engineers
make tracks for
Duff-Norton...



Constant research and rigidity of control in manufacturing techniques have made the name Duff-Norton synonymous with the finest jacks you can buy.

Of interest to Railway Engineers is the Model 117 illustrated. A genuine Duff-Norton Jack designed specifically for railway track maintenance. 15 ton capacity, single acting trip lowering ratchet.

...Duff-Norton
make jacks for
railway engineers



DUFF-NORTON

— the finest name in Jacks

MADE BY CONSOLIDATED PNEUMATIC TOOL CO LTD • DAWES ROAD • LONDON • S.W.6
CPIND

LE CARBONE "A.D." CELLS

are outstanding for long life in storage and intermittent or light service

High Capacity for low weight

Salammoniac Dry Cells to B.S. 1335/1946 have 90% capacity after 12 months' storage.

Wet and Inert Caustic Soda Cells up to 2,500 W.H. Capacity.

CATALOGUE AND FURTHER INFORMATION ON REQUEST

LE CARBONE (Great Britain) LTD., Office & Works: Portslade, Sussex, England

Telephone: HOVE 48268

Representatives and Associated Companies throughout the World

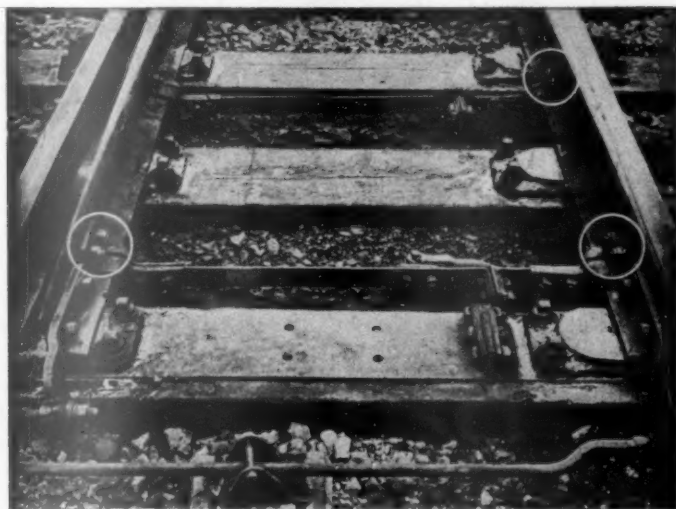


Renewal of A.D. Inert Caustic Soda cells at one of several unattended Radio Stations in Spitzbergen. These stations send out signals to guide navigation without interruption throughout the year. They are operated by a battery of 55 Cells which is renewed each year at the annual visit.

Telegrams: "CARBOLAC, BRIGHTON"

FOR 'PERMANENT' FASTENING

By Courtesy of BRITISH RAILWAYS (WESTERN REGION). We show below 'PALNUTS' fitted to the permanent way.



MAY WE QUOTE TO YOUR SPECIFICATION?

For further details apply

THE PALNUT COMPANY LIMITED

PALNUT WORKS, 3, ARTHUR STREET, HOVE 3, SUSSEX

'PALNUT' Safety Lock Washers

(Regd. Trade Mark)

- The safe economical locking device indispensable for all equipment subject to vibration.
- Functions on short bolt lengths, dispenses with drilling for split pins, cannot distort bolt thread.
- Available in all sizes, from 6 BA to 2 in. Whitworth in Plain steel, Cadmium and Hot Dip Galvanised finishes.

PALNUT IN SERVICE ►

Spins on—
Stays locked



Tel.: HOVE 70427
Telegrams: PALNUT, HOVE

Scientific Bolt Tightening



BY THE **TORSHEAR METHOD**



OR **MANUAL GEAR BOX**

★
**NO
OPERATOR
CONTROL**



★
**FOR
GOOD
OPERATORS**

OR **TORQUE WRENCH**



★
**FOR
STRONG
OPERATORS**

**5 TO 5,000 LB. FT.
POWER OR HAND APPLIED**

NORBAR

NORTH BAR TOOL Co. Ltd.

Torque Equipment Manufacturers

BANBURY, OXON.

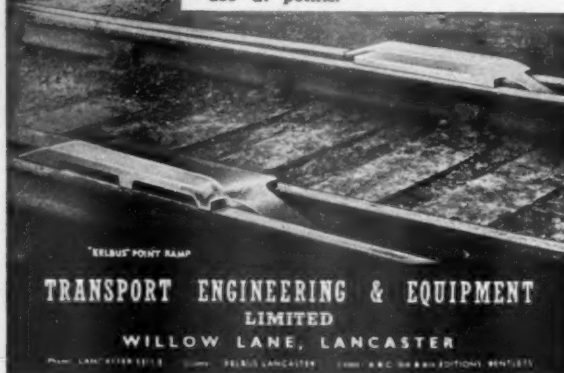
TELEPHONE: BANBURY 4234/5.



UNIQUE FEATURES:

NON-TILTING 'GUIDING TONGUE'
SELF-ADJUSTING **PORTABLE**

A complete set comprises three pairs, which handle all forms of derailment. Two pairs (one pair to be on left of rail and the other on the right) are for open track, and one special pair for use at points.



**TRANSPORT ENGINEERING & EQUIPMENT
LIMITED**
WILLOW LANE, LANCASTER



**ensures
permanent
tightness**

That nut must stay tight.
That pin securely locked.
Either way, the job calls for
GROVERLOK.
GROVERLOK spring lock-
washers, in girder, flat or
square section ensure that
any nut will remain tightly
fixed.

GROVERLOK spring ten-
sion pins fit accurately,
tightly, without special
drilling or reamering.
Both can easily be used
by unskilled labour, both
are thoroughly reliable.

GROVER & CO. LTD.

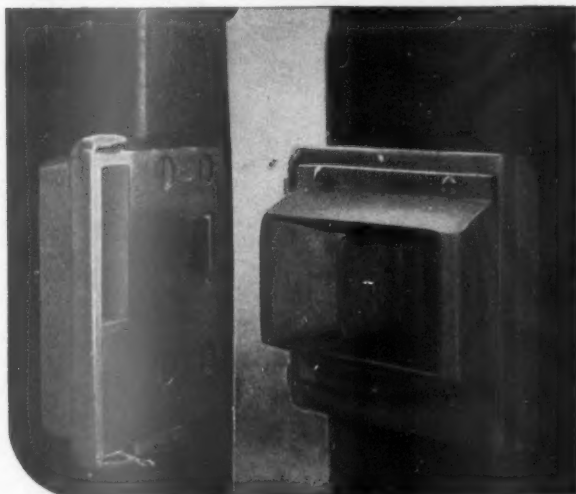
BRITANNIA ENGINEERING WORKS
CARPENTERS RD., LONDON, E.15
TELEPHONE: MARYLAND 4342-3



Photograph by courtesy of British Railways

KAYE'S

AUTOMATIC WEDGE LOCKS



have been in use on British Railways for more than 60 years; and are now being fitted to doors of Diesel Inter-City and Suburban Rail-Cars.

JOSEPH KAYE & SONS LTD.

LOCKWORKS

HUNSLET • LEEDS 10

London Office: 1-5 New Bond Street, W.1



In India

THEY SAY चाय FOR TEA

but

BECLAWAT FOR WINDOWS

Manufacturers of windows and door gear
for transport in the United Kingdom,
Australia, Canada, India, South Africa
and Sweden.



BECKETT, LAYCOCK & WATKINSON LTD., ACTON LANE, LONDON, N.W.10

INDEX TO ADVERTISEMENTS

Abington King Dick, Ltd.	32, 33	Cleveland Bridge & Engineering Co., Ltd.	—	Hallam, Sleigh & Cheston, Ltd.	—	Miner, W. H., Inc.	—	Smith's Industrial Instruments, Ltd.	—
Abtus, Ltd.	—	Clyde Rubber Works Co., Ltd.	—	Hardy Spicer, Ltd.	—	Mirriss, Bickerton & Day, Ltd.	—	Smith, John (Keighley), Ltd.	—
Aircraft Marine Products (Gt. Britain), Ltd.	15	Cobra (Wood Treatment), Ltd.	—	Harper, John, & Co., Ltd.	—	Mitchell, Shackleton & Co., Ltd.	16	Smith, Thos., & Sons (Rodeley), Ltd.	27
Alfco Water Treatment Service	—	Cockerill, S. A., Ougro	—	Hasler Telegraph Works, Ltd.	—	Morgan Carbon Ltd.	36	Smith, W., Gilmour & Co., Ltd.	—
Alldays & Onions, Ltd.	—	Colvilles, Ltd.	—	Henderson & Keay, Ltd.	—	Murex Welding Processes, Ltd.	—	Southern Forge Co., Ltd.	18
Allen, Edgar, & Co., Ltd.	—	Commonwealth Sales Corporation	—	Henschel Werke, G.m.b.H.	—	National Provincial Bank	—	South Wales Switchgear Co., Ltd.	—
Allgemeine Elektricitats-Gesellschaft	—	Consolidated Brake & Engineering Co., Ltd.	11	Hitachi, Ltd.	—	Neal, R. H., & Co., Ltd.	—	S.P.E. Co., Ltd.	—
Andre Rubber Co., Ltd.	—	Consolidated Pneumatic Tool Co., Ltd.	38	Hoffmann Manufacturing Co., Ltd.	—	Newall, A. P. & Co., Ltd.	—	Spencer Moulton, George, & Co., Ltd.	—
Armstrong Patents Co., Ltd.	—	Conveyancer Fork Trucks, Ltd.	—	Holman Bros., & Co., Ltd.	—	Newton Bros. (Derby), Ltd.	—	Standard Telephones & Cables, Ltd.	28
Asquith, Wm., Ltd.	—	Cooper, Geo., & Sons	—	Howard Pneumatic Engineering Co., Ltd.	—	Nife Batteries, Ltd.	—	Steel Coy. of Wales, Ltd.	—
Associated British Machine Tool Makers, Ltd.	26	Cowventry Machine Tool Dockers Brothers	—	Hudwell Clarke & Co., Ltd.	—	Nixon Signal Co., Ltd.	—	Steel, Peoch & Tozer	—
Associated Electrical Industries-GRS, Ltd.	—	Cowans, Sheldon & Co., Ltd.	—	Humble Engine Co., Ltd.	—	North Bar Tool Co., Ltd.	40	Steel Engineering Products, Ltd.	—
Associated Electrical Industries (Manchester), Ltd.	44	Craven Bros. (Manchester), Ltd.	13	Hyatt Engineering Co., Ltd.	—	North British Locomotive Co., Ltd.	—	Stirk, John, & Sons, Ltd.	—
Associated Electrical Industries (Rugby), Ltd.	—	Cravens, Ltd.	8	Imperial Aluminium Co., Ltd.	—	Nuts & Bolts (Darlaston), Ltd.	—	Stone, J., & Co. (Deplford), Ltd.	—
Associated Electrical Industries (Woolwich), Ltd.	—	Crompton Parkinson, Ltd.	—	Imperial Chemical Industries, Ltd.	—	Oleo Pneumatics, Ltd.	—	Stream Line Filters, Ltd.	—
Associated Lead Manufacturers, Ltd.	—	Davey, Paxman & Co., Ltd.	—	Intermit, Ltd.	—	Ormerod Shapers, Ltd.	—	Suffolk Iron Foundry (1920), Ltd.	—
Atlas-Copco A/B	—	Davies & Metcalf, Ltd.	14	International Twist Drill Co., Ltd.	—	Osborn, Samuel, & Co., Ltd.	—	Sulzer Bros. (London), Ltd.	—
Auster, Ltd.	—	Dean, Smith & Grace, Ltd.	—	Isca Foundry, Ltd.	—	Ottermill Switchgear, Ltd.	—	Summerson, Thos., & Sons, Ltd.	—
Austin Taylor Electrical, Ltd.	—	Dorman Long (Africa), Ltd.	—	Isotermos, Societ' Internationale des Applications	—	Owens & Dyson, Ltd.	—	Swift, George, & Sons, Ltd.	—
Automotive Products Co., Ltd.	—	Dragonair, Ltd.	25	Jackson Vibrators, Inc.	—	P. & M. Co. (England), Ltd.	39	Swiss Car & Elevator Manufacturing Corp., Ltd.	—
Bagnall, W. G., Ltd.	—	Dreury Car Co., Ltd.	—	Kaye, Joseph, & Sons, Ltd.	41	Painot Co., Ltd., The	—	Swiss Industrial Company	2
Baker, John, & Bessemer, Ltd.	30	Drummond Asquith, Ltd.	—	Kearns, H. W., & Co., Ltd.	—	Parkinson Cowan Industrial Products, Ltd.	—	Swiss Locomotive & Machine Works	—
Bayliss, Jones & Bayliss, Ltd.	19	Du Pont (United Kingdom), Ltd.	—	Kearns, Robert, & Co.	—	Parkinson, J., & Son (Shipley), Ltd.	—	Sylgas Company, The	—
Beckett, Laycock & Watkinson, Ltd.	41	Eagle Construction Co., Ltd.	—	Kendall & Gent, Ltd.	—	Paterson Hughes Engineering Co., Ltd.	—	Talbot Waggonfabrik	—
Belships Co., Ltd., Skiba A/S	—	Elastic Rail Spike Co., Ltd.	34	Kenitra Co., Ltd.	3	Pearson Machine Tool Co., Ltd.	—	Tanges, Ltd.	—
Benjamin Electric Co., Ltd.	—	Enfield - Standard Power Cables Ltd.	—	King, George W., Ltd.	—	Pel. Ltd.	—	Tarmac Roadstone Ltd.	—
B.E.N. Patents, Ltd.	—	English Electric Co., Ltd.	—	Kishu Seizo Kaisha, Ltd.	—	Pernali, Ltd.	—	Taylor Bros. & Co., Ltd.	—
Beresford, James & Son Ltd.	—	English Steel Corporation, Ltd.	—	Kitchen & Wade, Ltd.	—	Peters, G. D., & Co., Ltd.	11	Taylor Bros. (Sandiacre), Ltd.	35
Berry, Henry, & Co., Ltd.	—	E.N.V. Engineering Co., Ltd.	—	Klockner-Humboldt-Deutz, A.G.	—	Philup, Ltd.	—	Taylor, F., & Sons (Manchester), Ltd.	—
Beyer, Peacock & Co., Ltd.	—	Ericsson Signalaktiebolag, L.M.	—	Knorr-Bremse, G.m.b.H.	21	Pirelli-General Cable Works, Ltd.	—	Taylor Rustless Fittings Co., Ltd.	—
Beyer, Peacock Gorton, Ltd.	—	Eutectic Welding Alloys Co., Ltd.	—	Kretz, P., Ing. Dipl.	—	Planwell Engineering Co., Ltd.	—	Tearne & Sons, Ltd.	—
Beyer, Peacock (Hymek), Ltd.	—	Expanded Rubber Co., Ltd.	—	Krupp, Fried., Maschinenfabriken	—	Plasser Railway Machinery (G.B.), Ltd.	—	Tees Side Bridge & Engineering Works, Ltd.	—
Beyer, Peacock, Railway Equipment, Ltd.	—	Eye Smelting Co., Ltd.	—	Kugelfischer Georg Schafer & Co.	—	Plessner & Theurer	—	Telephone Manufacturing Co., Ltd.	22
Bintex, Ltd.	—	Fairclough, Leonard, Ltd.	—	Kyosan Electric Mfg. Co., Ltd.	—	Powell Duffryn Engineering Co., Ltd.	—	Thermit Welding (Gt. Britain), Ltd.	—
Birfield Industries, Ltd.	—	Falk, Stadelmann & Co., Ltd.	—	Lace Web Spring Co., Ltd.	—	Preformed Line Products (Gt. Britain), Ltd.	—	Thomas, Richard, & Baldwin, Ltd.	—
Birkett, T. M., Billington & Newton, Ltd.	—	Fawcett Preston & Co., Ltd.	—	Lamigraph, Ltd.	—	Pressed Steel Co., Ltd.	—	Thompson, John, Motor Pressings, Ltd.	—
Birmingham Railway Carriage & Wagon Co., Ltd.	—	Ferguson Battery Co., Ltd.	—	Lamp Manufacturing & Railway Supplies, Ltd.	—	Provident Mutual Life Assurance Association	—	Thompson, John, Motor Pressings, Ltd.	—
Bolton Gate Co., Ltd.	—	Ferodo, Ltd.	—	Lang, John, & Sons, Ltd.	—	Rawlings Manufacturing Co., Ltd.	—	Tempered Spring Co., Ltd.	—
Bolton, Thos., & Sons, Ltd.	—	Fibreglass, Ltd.	—	Lang, John, & Sons, Ltd.	—	Regent Oil Co., Ltd.	—	Thomson, Thomas, Sons & Co. (Barhead), Ltd.	—
Bonded Laminates Ltd.	—	Flexol Engineering Co., Ltd.	—	Leasing Bagnall, Ltd.	—	Reynolds A. & Co., Ltd.	10	Thomson, Thomas, Sons & Co. (Barhead), Ltd.	—
Booth, James, Aluminium, Ltd.	—	Flexol Engineering Co., Ltd.	—	Laycock Engineering, Ltd.	—	Rhein Stahl Sieger Eisenbahnbedarf, A.G.	—	Thomson, Thomas, Sons & Co. (Barhead), Ltd.	—
Booth, James, Aluminium, Ltd.	—	Fowler, John, & Co. (Leeds), Ltd.	—	Le Carbone (Great Britain), Ltd.	39	Richards, Chas., & Sons, Ltd.	—	Town, Fredk., & Sons, Ltd.	—
Booth, James, Aluminium, Ltd.	—	French Railways	—	Leeds Engineering & Hydraulic Co., Ltd.	—	Roberts, Charles, & Co., Ltd.	—	Town, Fredk., & Sons, Ltd.	—
Booth, James, Aluminium, Ltd.	—	Ganz-Mavag	12	Levick, John, Ltd.	—	Roberts, J. W., Ltd.	—	Transport Brakes, Ltd.	—
Booth, James, Aluminium, Ltd.	—	General Electric Co., International	5	Lifting Gear Products (Engineering) Ltd.	—	Rolls-Royce, Ltd.	—	Transport Engineering Equipment, Ltd.	40
Booth, James, Aluminium, Ltd.	—	General Motors Overseas Operations	—	Lockheed Precision Products, Ltd.	—	Rozalex, Ltd.	—	Trico-Folberth, Ltd.	—
Booth, James, Aluminium, Ltd.	—	General Steel Industries Inc.	—	Locksple Ltd.	—	Ruston & Hornsby, Ltd.	—	Triplex Safety Glass Co. Ltd.	—
Booth, James, Aluminium, Ltd.	—	Glacier Metal Co., Ltd.	—	Londex Ltd.	—	Saunders Valve Co., Ltd.	—	Tulloch, Ltd.	—
Booth, James, Aluminium, Ltd.	—	Gloucester Railway Carriage & Wagon Co., Ltd.	—	Luwa, G.m.b.H.	9	Scammell Lorries, Ltd.	—	Turton, Geo., Platts & Co., Ltd.	—
Booth, James, Aluminium, Ltd.	—	Godwin Warren (Engineering) Ltd.	—	Macdonald, John, & Co. (Pneumatic Tools), Ltd.	—	Schindler Carriage & Wagon Co., Ltd.	—	Turton, Thos., & Sons, Ltd.	—
Booth, James, Aluminium, Ltd.	—	Greenwood's & Airvac Ventilating Co., Ltd.	—	Marcroft Wagons, Ltd.	—	Scottish Machine Tool Corporation, Ltd.	—	Tyer & Co., Ltd.	—
Booth, James, Aluminium, Ltd.	—	Gresham & Craven, Ltd.	17	Marsden, Samuel, & Son, Ltd.	—	Seitright Registers, Ltd.	—	United Steel Companies, Ltd.	—
Booth, James, Aluminium, Ltd.	—	Griffiths Bros. & Co. (London) Ltd.	—	Marston Excelsior, Ltd.	—	Sheffield Twist Drill & Steel Co., Ltd.	—	Walker, James, & Co., Ltd.	—
Booth, James, Aluminium, Ltd.	—	Grover & Co., Ltd.	40	Maschinenfabrik Augsburg-Nurnberg, A.G.	—	Siege Gorman & Co., Ltd.	—	Ward, H. W., & Co., Ltd.	26
Booth, James, Aluminium, Ltd.	—	Hackbridge & Hewitt Electric Co., Ltd.	—	Massey, B. & S., Ltd.	—	S. G. E. Signal Ltd.	—	Ward, Thos. W., Ltd.	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Matias Equipment, Ltd.	—	Siemens & Halske, Akt.	—	Westport, N.V.	—
Booth, James, Aluminium, Ltd.	—	Hadfields, Ltd.	23	Maus, J.M.J., Ltd.	—	Silentbloc, Ltd.	—	Westinghouse Brake & Signal Co., Ltd.	4
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metalastik, Ltd.	—	Simmonds Aerocessories, Ltd.	20	White, R., & Sons (Engineers), Ltd.	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metallic Seamless Tube Co., Ltd.	—	Simmonds & Stokes (Niphan), Ltd.	—	Wickham, D., & Co., Ltd.	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	Simon Engineering Dudley	—	Wild, A. G., & Co., Ltd.	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	Skefro Ball Bearing Co., Ltd.	—	Williams, H.	31
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	Wine & Coles, Ltd.	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	Worlington Iron & Steel Co.	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	Wright Anderson & Co., Ltd.	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	Wynn-Williams, Llewelyn, Ltd.	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	—	—	—	—	—
Booth, James, Aluminium, Ltd.	—	Hackbridge Cable Co., Ltd.	—	Metropolitan-C					



East African Railways

The illustration shows two of the new 'Class 90' Diesel-Electric locomotives now in service with the East African Railways.

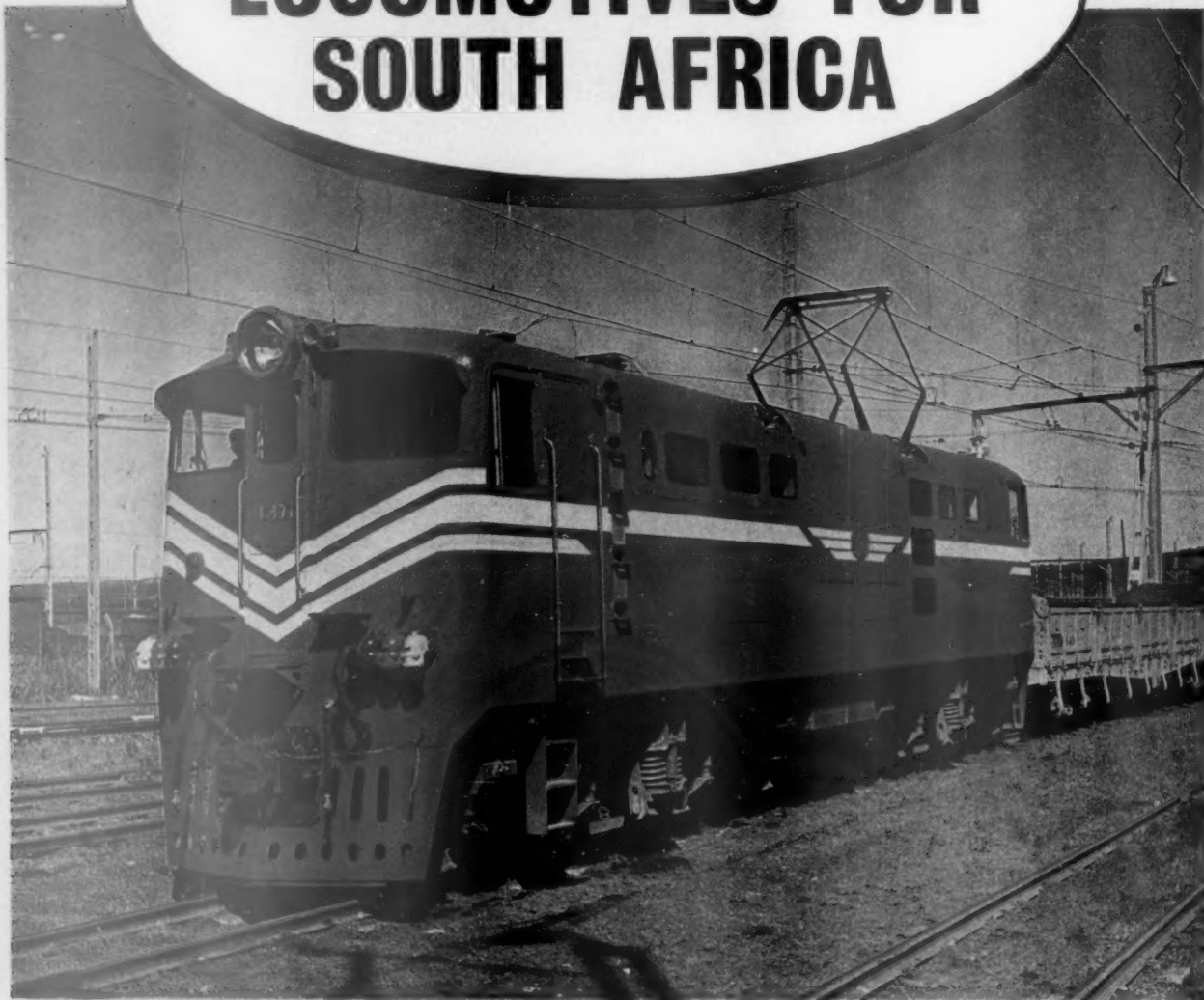
These locomotives, built by The English Electric Co. Ltd., in conjunction with their associates, Robert Stephenson and Hawthorns, have the 1 Co-Co 1 wheel arrangement, well suited to the local conditions. The gauge is 1 metre, convertible to 3 ft. 6 in.

All axles run in Timken bearings, mounted in axleboxes and cannon-boxes also supplied by the bearing manufacturer.

British Timken, Duston, Northampton, Division of The Timken Roller Bearing Company. Timken bearings manufactured in England, Australia, Brazil, Canada, France and U.S.A.

TIMKEN[®]
REGISTERED TRADE-MARK
tapered roller bearings

AEI 3000 volt LOCOMOTIVES FOR SOUTH AFRICA



*One of the 135 AEI 3000 volt
2280 hp 84 ton D.C. electric
locomotives, in service with
South African Railways.*

No fewer than 345 electric locomotives have
now been ordered from AEI by this
customer together with 350 sets of motor
coach equipment for the Reef and Cape
Western electrifications.

*Enquiries to AEI Traction Division,
Trafford Park, Manchester 17, or your local AEI Office*



Associated Electrical Industries Ltd.
Traction Division
MANCHESTER AND LONDON

